STEEL

The

Metalworking Weekly

APRIL 18, 1960

A PENTON PUBLICATION

Tool Steelmakers Expand Markets

The tool steel being forged (above) could wind up in a nontool application. These steels are playing an exciting new role as construction materials where specifications call for such properties as toughness, hardness, temperature resistance, abrasion resistance, and dimensional stability. You'll find tool steel components in missiles, jet engines, airframes, and in many civilian products, including firearms, gears, diesel engines, electrical fittings, temperature controls.

This special STEEL study, a 16 page report for managers, is No. 4 in our series on Trends in Metals. It starts on Page 127. Sections cover:

- Survey of 3000 users—Page 129
- Trends in application—Page 133
- How to select, order—Page 137
- Trends in production—Page 140

What Does the Decline in the Steel Operating Rate Really Mean?

How to Foil Executive Pirates

Wiremakers Predict Sales Upturn

PRODUCTION EFFICIENCY

To Get It, We Need Depreciation Reform!

No. 8 in STEEL's Program for Management

CONTENTS—TURN PAGE

HIGH-REDUCTION BEVEL GEARS

To the nine gear types* already made by us for a long list of leading manufacturers, we now add High-Reduction Bevel Gears to meet a growing demand for the economy and speed reduction accomplished by this type of power transmission.

These DOUBLE DIAMOND High-Reduction Bevel Gears will supply speed reduction normally considered impractical in a single gear set of this type. In many cases they will replace more complex and more costly gear systems, thus improving design and achieving simplicity, while considerably lowering costs.

One of our gear engineers would be more than pleased to meet with you to discuss fully the interesting possibilities of this new member of the DOUBLE DIAMOND family.

EATON

AUTOMOTIVE GEAR DIVISION
MANUFACTURING COMPANY
RICHMOND, INDIANA

GEARS FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

*Angular bevel gears, Helical gears, Spur gears, Flywheel ring gears, Hypoid bevel gears, Straight bevel gears, Spline shafts, Zerol† bevel gears, Spiral bevel gears. Also gear assemblies.

†REG. U.S. PAT. OFF.

This Week in STEEL
The Metalworking Weekly

April 18, 1960 Vol. 146 No. 16

PRODUCTION EFFICIENCY

Why and How of Depreciation Reform

Depreciation reserves are being eroded at the rate of $6 billion a year by federal policies. This tax climate has severely buffeted U. S. production efficiency. But change will never come unless you completely sell yourself and others on its need and feasibility. Here's the first of two articles you'll want to read on the "why" and "how" of depreciation reform. This week's article deals primarily with the "why." The "how" will be presented May 2. PAGE 91

What Does the Drop in Steel Operations Mean?

Basically, it means that steel production has now moved into closer alignment with steel consumption by the nation's metalworkers. We're still using steel at a rate of nearly 80 million tons a year—that's more steel than was consumed in the boom years of 1955 and 1957. What's more, the drop signals a switch from a seller's to a buyer's market. PAGE 81

New Electronic Ear Detects Faint Space Signals

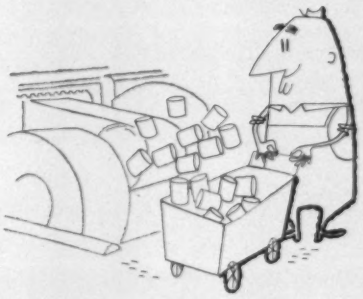
A new electronic listening device developed by Hughes Aircraft Co. can tune in distant stars and track space probes to new limits. Faint signals are amplified by a unique device that works best near absolute zero. PAGE 83

How to Keep Man Hunters Out of Your Plant

Like the tycoon who hired a burglar to teach him how to keep from being robbed, STEEL asked the partners of a leading executive recruiting firm what factors most influence a man to stay in a job—or leave for another position. They list 15 approaches you can use to keep good men from being stolen. PAGE 84

Aluminum Set to Launch Major Attack on Can Market

Expect a growing number of products to appear this year in new aluminum containers as producers push new applications for the light metal. Already widely accepted for beer and motor oil packaging, the aluminum can will be test marketed as a frozen fruit juice container and cosmetic spray can. Producers hint at new market breakthroughs; one is expanding can stock facilities to meet the upsurge. PAGE 86



Manufacturers' Wire Heads for Near Record

Near record shipments are in sight this year for manufacturers' wire. Despite current sluggishness, producers say output will jump 10 per cent over that in 1959. Dark cloud: Increasing imports of foreign specialties and low carbon wire through East, Gulf, and Great Lakes ports. PAGE 165

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We tailor our sheets to fit the application

Whether you need a steel sheet for deep-drawing, or one with a special surface requirement, you can count on Bethlehem to furnish just the right steel sheet for your needs.

Our modern mills at Sparrows Point, Md. and Lackawanna, N.Y. are as finely equipped and expertly manned as any in the nation. And our metallurgists will work with you all the way. We'd like the chance to serve you.

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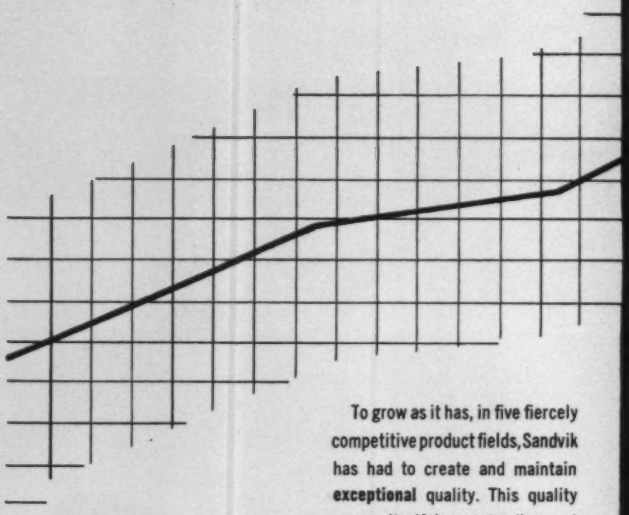
Extraordinary QUALITY

Major Reason For SANDVIK'S GROWTH



To grow as it has, in five fiercely competitive product fields, Sandvik has had to create and maintain **exceptional** quality. This quality proves itself in outstanding and consistent performance. And, it is this performance which has earned, held and increased Sandvik's customers.

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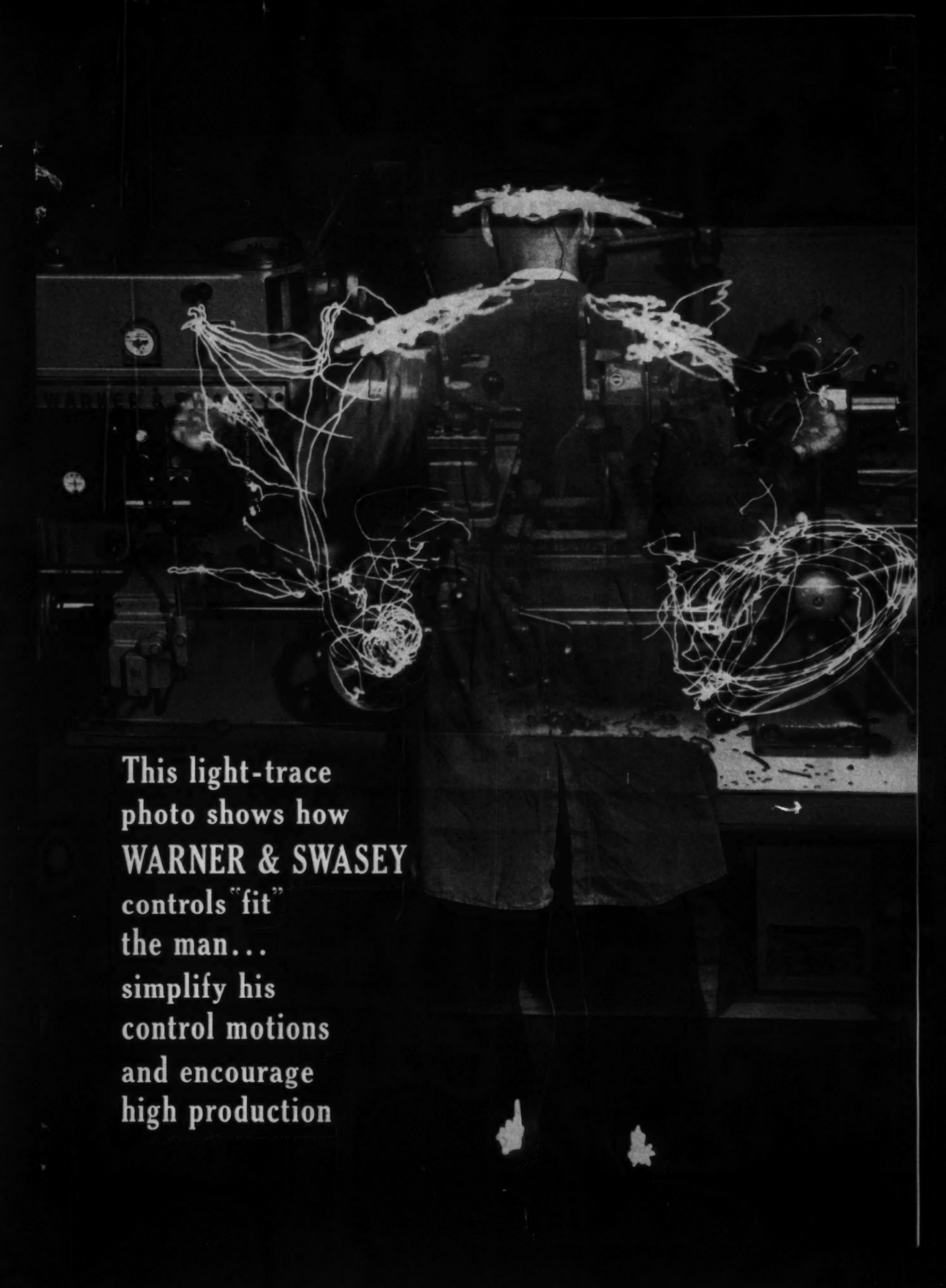
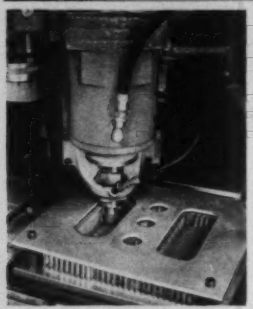

This light-trace
photo shows how
WARNER & SWASEY
controls "fit"
the man...
simplify his
control motions
and encourage
high production

PROGRESS REPORT

NOW Anocut Electrolytic Machining for CAVITY-SINKING as well as ROTATING-WHEEL applications

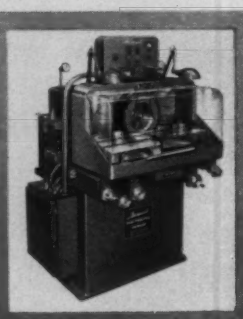


MACHINING POCKETS IN FRAGILE STAINLESS STEEL HONEYCOMB FREE OF LAYOVER AND BURR. PHOTO COURTESY EKSTROM, CARLSON & CO.

Rotating-Wheel Anocut

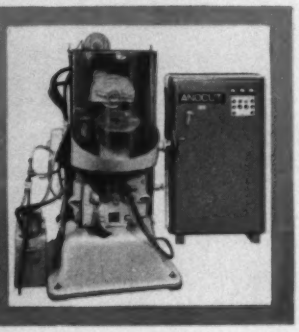
is used for metals which are (1) hard, (2) tough, (3) heat sensitive or (4) easily burred wherever an open surface is to be machined to high accuracy and high finish. It will produce surfaces which are flat or curved (inside or outside) or continuous forms, as in form grinding. Wherever a rotating wheel can be applied this method offers tremendous savings in time and abrasive cost.

MOUNTING STATOR RING FOR ELECTROLYTIC MACHINING OF VANE TIPS TO ACHIEVE PRECISE CONCENTRICITY AND SIZE. OPERATION IS FAST AND ELIMINATES DEBURRING, SAVING LABOR COSTS AND REDUCING SCRAP.



MODEL EG-12 ELECTROLYTIC OSCILLATING GRINDER WITH TWO AIR-OPERATED TILTING TABLES. DESIGNED FOR PRODUCTION WORK ON FLAT SURFACES OF JET ENGINE AND ROCKET ENGINE COMPONENTS AND OTHER TOUGH OR HARDENED STEEL PARTS, DOVE-TAIL OR CIRCULAR FORM TOOLS, ETC. PHOTO COURTESY HAMMOND MACHINERY BUILDERS, INC.

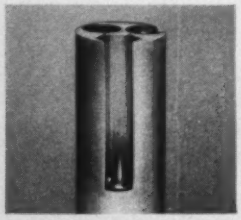
AUTOMATIC ELECTROLYTIC FACE MILL GRINDER. VARIABLE SPEED MOVABLE RAM CAN BE ADJUSTED TO SHARPEN COMPLETE CUTTER IN ONE REVOLUTION OF TABLE, REMOVING .005" TO .020" FROM EACH TOOTH. FORTY-FOUR TOOTH CUTTER, 16" DIAMETER, SHARPENED IN 22 MINUTES, REMOVING .012" FROM EACH TOOTH, GRINDING CARBIDE AND STEEL SIMULTANEOUSLY. PHOTO COURTESY OLIVER INSTRUMENT CO.



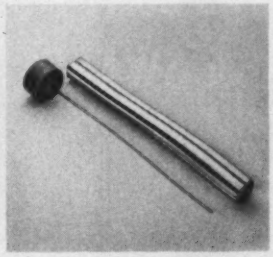
NEW MACHINE - SAME PRINCIPLE

Plunge-Electrode Anocut sinks a shaped electrode into hard or tough metals by the same electrochemical principle as rotating-wheel Anocut. Unlike electro-discharge spark machines it has high removal capacity, no electrode wear, and is therefore intended for repetitive production jobs.

MODEL HCS-59 ELECTROLYTIC CAVITY-SINKER. APPLIES SAME BASIC ELECTROLYTIC PRINCIPLE TO THE SINKING OF IRREGULAR HOLES AND SHAPES FOLLOWING THE CONTOUR OF THE ELECTRODE MADE FOR THE PURPOSE. THE ELECTRODE IS SIMPLY PLUNGED LINEARLY INTO THE WORK MATERIAL.



HEXAGONAL HOLE 1" DEEP, ¼" ACROSS FLATS, IN UDIMET 700. NOTE STRAIGHTNESS AND SHARPNESS OF WALLS WHERE ELECTRODE BROKE THROUGH. CONICAL TIP IN BOTTOM OF BLIND HOLE CAN BE ELIMINATED. INTERIOR-COATED ELECTRODE USED FOR ROUND HOLES IN BACKGROUND.



SEVEN INCH LONG, .078" DIAMETER HOLE ELECTROLYTICALLY "DRILLED" IN UDIMET 700. ROD HAS BEEN SURFACE GROUND TO EXAMINE STRAIGHTNESS OF HOLE. NO WEAR ON ELECTRODE.

ELECTROLYTIC TREPANNING. DESIRED FORM EXTENDS INTO INTERIOR OF SHAPED ELECTRODE. NOTE HIGH FINISH ON BLADE FORM.

ANOCUT T.M. Reg.

ENGINEERING COMPANY

631 WEST WASHINGTON BLVD. • CHICAGO 6, ILL. • PHONE STATE 2-5480

Please direct all correspondence to attention of Ed Service, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

April 18, 1960

This Lady Has the Answers

You see a lot of cheesecake and short skirts at trade shows, but here's one gal who doesn't have to rely on such things to gain your attention. Her name: Mrs. Florence Smith. Many of you will see her operating a precision grinder at Federal Product Corp.'s booth during the American Society of Tool & Manufacturing Engineers show in Detroit, Apr. 21-28. Here's why she'll be there . . .

When she went to work for the Providence, R. I., company in 1942, Mrs. Smith's mechanical ability made her a natural for machine shop assignment as an apprentice turret lathe operator. Six months later, she was skillfully working the relatively new and difficult to handle tungsten carbide.

She has been with Federal ever since. She was highly complimented four years ago when she was selected to operate a jig grinder in Federal's precision grindingroom. She mostly produces special masters for precision gages—with accuracies often measured within 50 millionths of an inch. She also operates other grinders and will demonstrate an electronic work positioning gage on a universal grinder at the ASTME show.

To Market, to Market . . .

General Motors Corp. has some curious items on its $5.5 billion shopping list. Among them are a few that a housewife might order: Plastic clothespins to suspend soldering iron cords . . . walnut shells for use as abrasives on ball bearings . . . hair dye to identify nylon gears . . . hog nose rings to fasten temporary identification tags to machinery . . . oleomargarine to coat battery straps to prevent acid corrosion . . . electrically charged marbles for dust and lint catchers . . . eyebrow tweezers to pick out lead wires in coil assemblies . . . lint to test laundry filtering devices.

How Hot Is Hot?

"We would like two copies of your Mar. 14 article, 'Do You Really Know How Hot It Is?'—one for our Instrument Dept. and one for our laboratories," writes R. E. Brobst, supervisor, Metals Quality Control Laboratories, Western Brass Mills Div., Olin Mathieson Chemical Corp., East Alton, Ill.

"Though the article covers 'basic knowledge,' there are a number of interested people in these departments who have not had the opportunity to obtain it. The article was well illustrated and efficiently presented."

Roundin' the Bend

Someday we'll be seeing industrial switching locomotives chugging along the tracks without a crew in the cab. Plymouth Locomotive Works Div., Fate-Root-Heath Co., Plymouth, Ohio, is investigating practicability of operating a switch engine by remote radio control. Equipment on order will permit remote starting, speed and direction control, plus stopping and shutoff. Track sander and whistle controls will be included.

As an aside on the railroad labor controversy, we note that featherbedding could bow in only if duplicate equipment is kept in reserve to carry on operations when original equipment breaks down.

They Look Too Late

"We would appreciate two copies of 'How to Rebuild a Company,' STEEL, Mar. 28," requests E. L. Aukerman, controller, Sight Feed Generator Div., Rexarc Inc., West Alexandria, Ohio. ". . . There are many companies like the Anderson Corp., that need to 'take a new look at themselves'; for some, they look too late. You are to be commended for publishing the article. There is no doubt that articles such as yours will convince many readers that management thinking requires remodeling . . ."

Are Incentives Necessary?

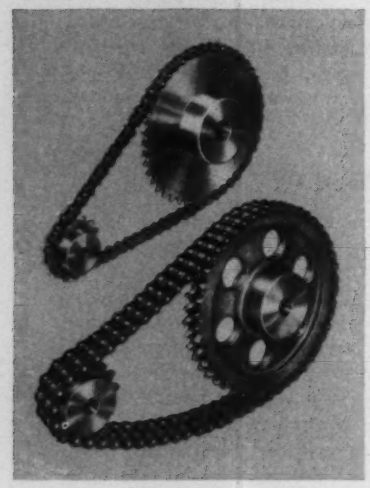
That question crops up with distressing frequency when managers prepare to face labor contract negotiations. Basically, incentives are designed to reward a worker for above-average output. In many instances, however, a machine paces the job, not the worker. Incentives aren't always equitable to the worker. He has no real control over material shortages or machine downtime, yet he receives a lower pay rate when these situations occur.

How about job changes? What happens if you shift a worker from a job on which he could

DO YOU HAVE THE PROPER

CHAIN SELECTION

FOR YOUR EQUIPMENT?



If there is a question in your mind about the correct size of chain to use for your particular installation, ACME Engineers will gladly assist you in selecting the proper chain drive. This depends on how much horsepower you want to transmit . . . the speed and size of your shaft . . . space limitations . . . hours of continuous operations, etc.

Consult your nearest ACME Distributor or write our Engineering Department for the answer to your CHAINING PROBLEMS.

Write Dept. 10-O for new 100-page illustrated technical catalog including new engineering section showing 36 methods of chain adjustments.

Acme Chain Corporation
HOLYOKE MASSACHUSETTS

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really make out to a less lucrative one? All too often, the shop steward files a time-consuming grievance.

Here's another one: If incentives get out of line, employment costs rise, and the manager finds himself operating at a cost disadvantage. It can cost a lot of money to unsnarl a tangled incentive system.

In researching incentives, News Editor Bill Dean found those and other factors fostering disenchantment with incentives and setting up what may be a new trend. You can read the story in next week's issue.

Navy Relief

"Would it be possible to obtain some of STEEL's Hardness Converters," asks A. J. Leonetti, superintendent Navy inspectors, Heintz Div., Kelsey-Hayes Co., Philadelphia. "We have ten Navy inspectors working out of this office and all of them use the card. We would appreciate anything you may do to relieve the cry: 'Who has STEEL's Hardness Converter card?' "

Relief is on the way, Mr. Leonetti.

Will You Wear the Sash?

If you're one of the many readers who entered STEEL's February Usership Idea of the Month contest, there's a chance you will don the winner's sash next week and collect $500. The judges have also selected ten readers who will receive honorable mention awards. No names now; you can find them here next week. In the meantime . . .

Enter the Contest

Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—April, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

You will win an additional $500 if you furnish written proof that you were successful in accomplishing your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

You can enter as many times as you wish. Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. Deadline for this month's contest is June 1, 1960.

Dual-bolster design permits tooling up of one bolster (left) while press is producing parts from die on the other. This press, at the A.O. Smith Corp., Milwaukee, Wis., has proved the economy of this design for the past 2 years.

Press downtime...cut from hours to minutes with the Hamilton dual bolster press

Hours — sometimes days — formerly wasted in changing dies can be used productively with the Hamilton sliding dual bolster press. While the operating bolster and die are turning out parts, the second bolster is being tooled up for the next production run. Push-button-controlled hydraulic motors position the standby bolster fast and surely for rapid startup and production of the next part — changeover time is a matter of minutes only.

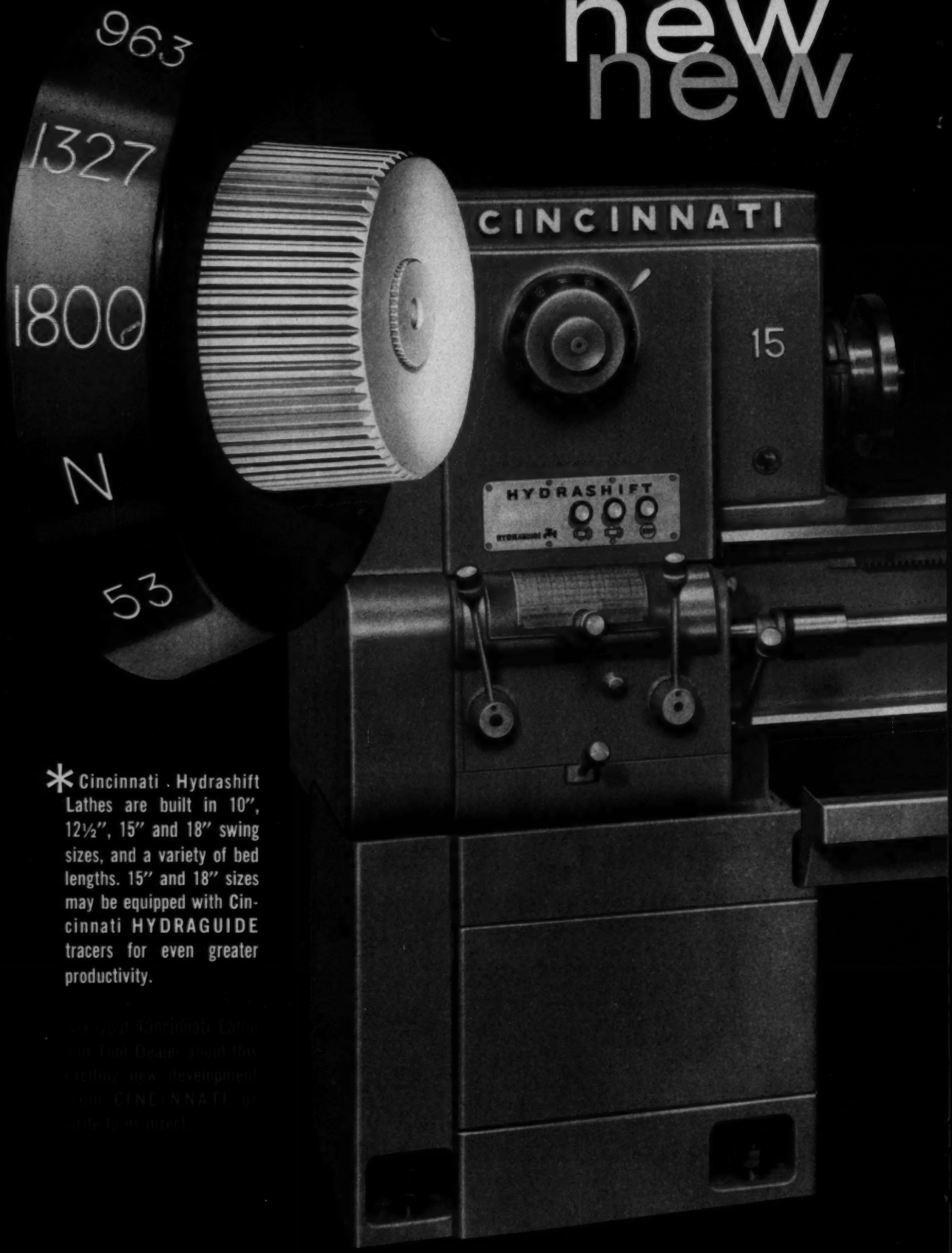
A 1250-ton, 2-point, top-drive press equipped with two sliding bolsters installed at a Midwest automobile parts plant is proving the economies of this innovation—on parts up to 12 ft. long. Reduced parts inventory, meeting schedules on time, and fewer presses needed to accommodate frequent die changes are among the benefits resulting. For detailed information on the new Hamilton dual bolster press, write Dept. P-1.

BALDWIN · LIMA · HAMILTON

Industrial Equipment Division · Philadelphia 42, Pa.

BALDWIN BLH LIMA-HAMILTON

new new



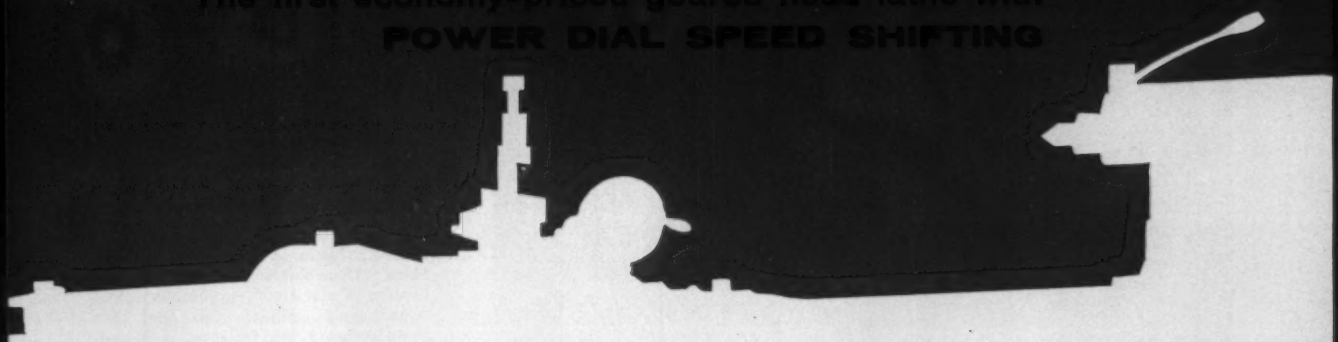
* Cincinnati . Hydrashift Lathes are built in 10″, 12½″, 15″ and 18″ swing sizes, and a variety of bed lengths. 15″ and 18″ sizes may be equipped with Cincinnati **HYDRAGUIDE** tracers for even greater productivity.

[illegible] Cincinnati Lathe [illegible] Tool Dealer about this [illegible] new development [illegible] CINCINNATI [illegible] to us direct.

from cincinnati lathe and tool

CINCINNATI HYDRASHIFT*

The first economy-priced geared head lathe with
POWER DIAL SPEED SHIFTING



HYDRAULIC POWER SUPPLIES THE MUSCLE ON NEW CINCINNATI HYDRASHIFT LATHES

Standard equipment on the new Cincinnati lathes includes HYDRASHIFT, the easiest and fastest method for spindle speed shifting on a geared head lathe. To change spindle speeds, the operator has only to dial the desired RPM . . . *hydraulic power supplies the muscle for the shift.*

New Cincinnati Hydrashift lathes are designed to provide more time for cutting and to reduce operator fatigue to a minimum. Yet, with their many new operating features, *they are still in the economy price class.*

new . . . FROM HEADSTOCK TO TAILSTOCK

new High Speeds with All-Geared Headstock—husky Hydrashift gearing provides 12 speeds in geometric progression up to 3000 RPM.

new Compound and Cross Slide—wider, stronger for heavy, high speed cuts; large, easy-read dials for greater accuracies with more operator speed and convenience.

new Quick-Clamping Tailstock—Cincinnati's unique tailstock design is even more versatile for fast tailstock positioning.

plus —NEW greater horsepower . . . NEW husky beds with "Hardclad" flame-hardened ways . . . NEW coded pushbutton controls . . . NEW chip pan (slides in and out for convenient cleaning) . . . Totally enclosed quick-change feed box with 48 threads and feeds . . . and many other exclusive features on the **NEW CINCINNATI HYDRASHIFT LATHES**

cincinnati lathe and tool co.

3207 Disney Street, Cincinnati 9, Ohio

"HYDRASHIFT" Lathes / "CINCINNATI" Drilling Machines / "SPIROPOINT" Drill Sharpeners

Shadow-free illumination in these two Binks spray booths is especially helpful when dark colors are applied. Efficient down-draft exhaust removes overspray . . . protects finishes . . . improves working conditions.

At Hyster Company, Danville, Illinois . . .

Integrated painting and production doubles lift truck output

"Painting is now an integrated part of our lift truck production line," reports Mr. A. L. Hazelbarth, Staff Assistant to the Factory Manager for the new Hyster Company plant in Danville, Illinois.

"The manufacturing knowledge of Binks spray finishing engineers helped us make the most efficient use of equipment, manpower and space."

Conveyorized painting
An under-the-floor conveyor guides trucks through each assembly phase. This same conveyor is used to guide the trucks through the painting phase. Intra-plant shuttling and holding area problems are eliminated. Maximum use is made of floor space.

Production-paced spray booths
Two 18′ high down-draft spray painting booths enable work to flow at a pace equal to assembly production. Shadowless illumination helps painters instantly spot imperfections. Work room is more than ample for efficient production.

Complete equipment coordination
A paint circulating system, hot spray and oven were all integrated by Binks engineers to give Hyster a production-tailored finishing operation of highest efficiency.

Call, wire or write today
See how Binks spray finishing engineers can help your product quality improvement and total cost reduction programs.

Ask about our spray painting school
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CALENDAR
OF MEETINGS

Apr. 18-19, Conference on Automatic Techniques: Sheraton-Cleveland Hotel, Cleveland. Sponsors: ASME, IRE, and AIEE. Information: J. H. McRainey, Room 530, 1213 W. Third St., Cleveland 13, Ohio.

Apr. 18-20, American Machine Tool Distributors Association: Semiannual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

Apr. 19-21, American Society of Lubrication Engineers: Annual meeting and exhibit. Netherland-Hilton Hotel, Cincinnati. Society's address: 5 N. Wabash Ave., Chicago 2, Ill. Executive secretary: Calvert L. Willey.

Apr. 20-22, National Association of Sheet Metal Distributors: Spring meeting, Deshler-Hilton Hotel, Columbus, Ohio. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Apr. 20-22, Rail Steel Bar Association: Annual meeting, Biltmore Hotel, Palm Beach, Fla. Association's address: 38 S. Dearborn St., Chicago 3, Ill. Secretary: W. H. Jacobs.

Apr. 21-22, American Institute of Mining, Metallurgical & Petroleum Engineers: Southwest metals and minerals conference, Ambassador Hotel, Los Angeles. Conference headquarters: Room 1234, 523 W. Sixth St., Los Angeles 14, Calif.

Apr. 21-28, American Society of Tool & Manufacturing Engineers: Tool show and annual meeting, Statler-Hilton and Sheraton Cadillac Hotels, Detroit. Society's address: 10700 Puritan Ave., Detroit. Executive secretary: Harry E. Conrad.

Apr. 24-27, Metal Powder Industries Federation: Annual meeting and powder metallurgy show, Drake Hotel, Chicago. Federation's address: 60 E. 42nd St., New York 17, N. Y. Executive secretary & treasurer: Kempton H. Roll.

Apr. 25-26, American Society of Mechanical Engineers: National Maintenance & Plant Engineering Conference, Chase-Park Plaza Hotel, St. Louis. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Apr. 25-29, American Welding Society: Annual meeting and welding exhibition, Biltmore Hotel and Great Western Exhibit Center, Los Angeles. Society's address: 33 W. 39th St., New York 18, N. Y. National secretary: Fred L. Plummer.

"Been workin' her hard for 14 years ...she's as fast and accurate as the day she arrived"

NIAGARA SHEARS

Precision made Niagara Shears are built to cut with micrometer accuracy . . . *and to keep cutting that way.*

Thousands are in use, but comments are nearly identical. Makes no difference how hard they're worked. Three shifts a day, month after month, year after year . . . a Niagara Shear *continues* to be accurate.

"Don't have to change knife clearance"

No adjustments needed for cutting different thicknesses of stock . . . even at the same time . . . with consistently accurate, burr-free results. *And much longer knife life!* The secret is in the rigidity of Niagara's exclusive box section design. "Upped production 25%," says one user, "because we have fewer adjustments to make."

"Costs less to operate"

There's less to do, less to learn and less to go wrong. Never even have to worry about damaging the machine by forgetting to change the knife clearance. Once set, Niagara Shears need no further adjustment. "Been using Niagara's for 10 years . . . never had downtime for repairs or maintenance," says another user. Even after long, hard use when it becomes necessary to turn the blades or change knives, it's a very easy matter. Nothing like Niagara Shears for simplicity.

FACT BOOK FOR YOU

Bulletin 69 is filled with customer reports on Niagara Shear performance. You'll value it. Write today.

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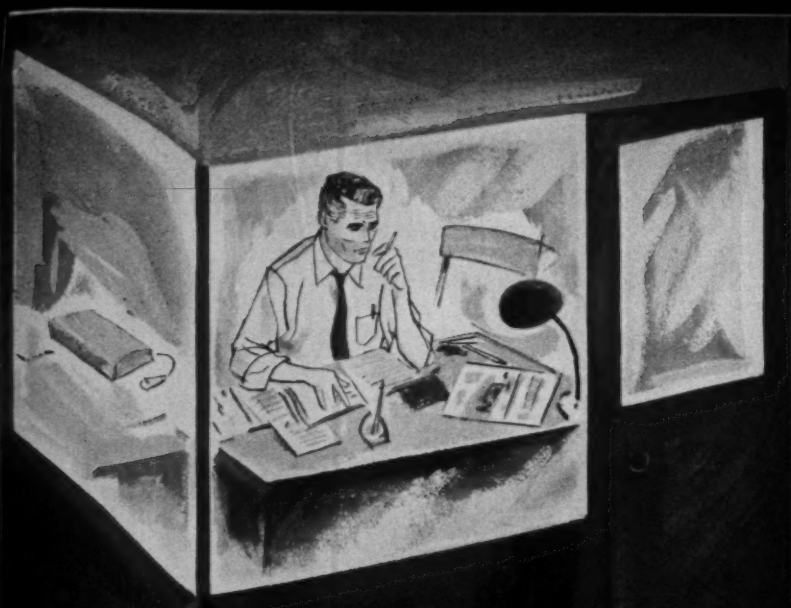

HOUR OF DECISION

After hours? — sure You're not surprised at that because you know it's when he (and probably you, too) concentrates on the problems which are vital to his company's continued successful growth. The day is filled with production crises, maintenance problems, personnel questions, and committee meetings. It's only now that he can really study the facts and decide what's best.

Right now he's reviewing his machine tool inventory. He's amazed at how old some of his equipment is getting to be. It seems only yesterday that he signed the purchase order for it to increase his capacity for World War II. But that was 1943, seventeen years ago! No wonder maintenance is getting high and efficiency is dropping off.

We've got a suggestion for this man (and for you, too). Attend THE MACHINE TOOL EXPOSITION — 1960 and see for yourself why Modern Machine Tools = Production Efficiency. This exhibit, the first since 1955, is sponsored by The National Machine Tool Builders' Association* and will contain eleven acres of the U.S.A.'s newest machine tools under power, cutting and forming metal to demonstrate 1001 ways to lower production costs. Can you afford to stay home?

You're also invited to the PRODUCTION ENGINEERING SHOW on the Navy Pier.

No extra registration needed.

*The N.M.T.B.A. represents 90% of the U.S.A. machine tool industry.

FORMULA FOR TOMORROW

MODERN MACHINE TOOLS MMT=PE PRODUCTION EFFICIENCY

International Amphitheatre
Chicago, Illinois
Sept. 6-16

THE MACHINE TOOL EXPOSITION – 1960

For information write to

NATIONAL MACHINE TOOL BUILDERS ASSOCIATION

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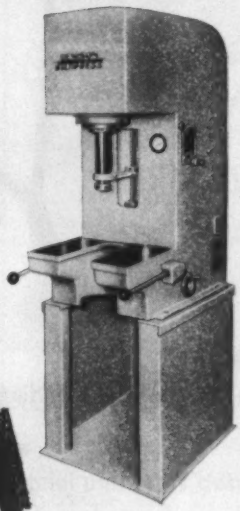
in new cost-reducing series
of DENISON "R-S-T"
hydraulic bench presses

NEW PRESS



NEW "R-S-T" SERIES MULTIPRESS . . . versatile cost-reduction tool on small lots or high production runs. Standard accessories available to increase productive capacity.

FREE BULLETIN . . . write for your copy of our 8-page specification and application Bulletin 324.

NEW PRESS series is designed to cut costs on your toughest production jobs. Here are the key advantages built into this new, ultra-efficient line of presses.

Produces more pieces-per-hour . . . 65% faster approach. Faster return speeds on the hydraulic ram give you more cycles-per-minute.

Simpler to tool . . . there's more daylight to mount tools for manual or automatic production.

Faster to set-up . . . new, quick, simple adjustment now sets position of ram in seconds. And you can "inch" the ram to the work under set pressure. Closer control of ram pressure is quickly attained with a newly-developed relief valve.

Handles wider range of work . . . ram stroke has been doubled for greater tool clearance for long, deep work.

Easier to operate . . . there's more knee room for operator convenience.

Simpler to maintain . . . complete motor and pump swing out of position to inspect and service the hydraulic system.

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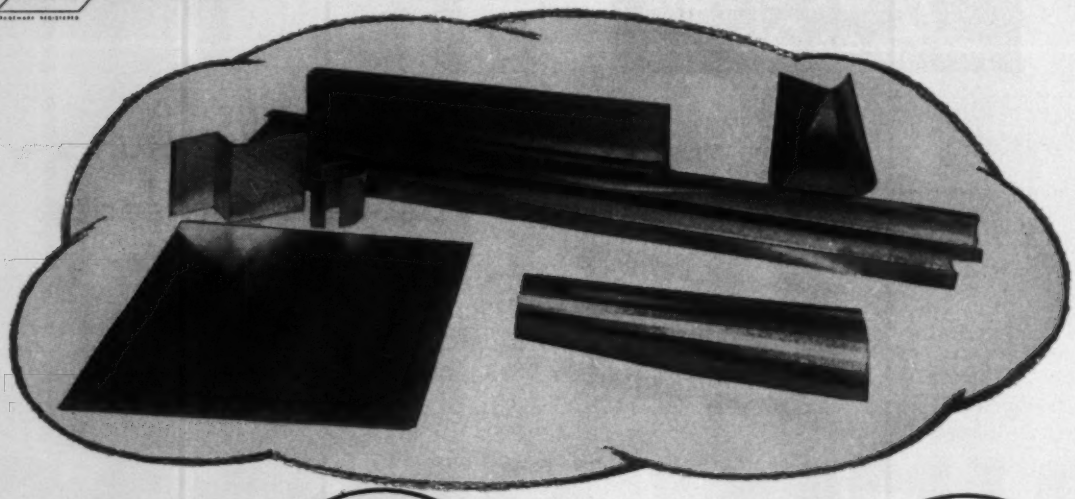
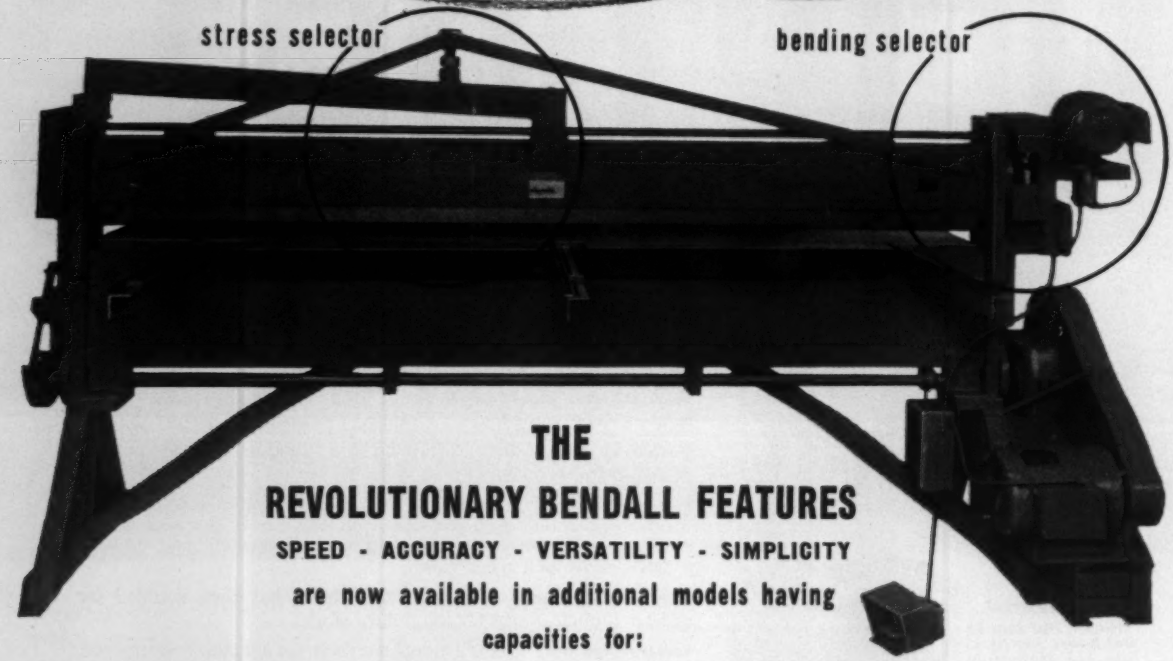
with the BENDALL





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are now available in additional models having capacities for:

- cross-braking 20 gauge galvanized steel at a selected angular bending degree thru lengths up to 130 inches.
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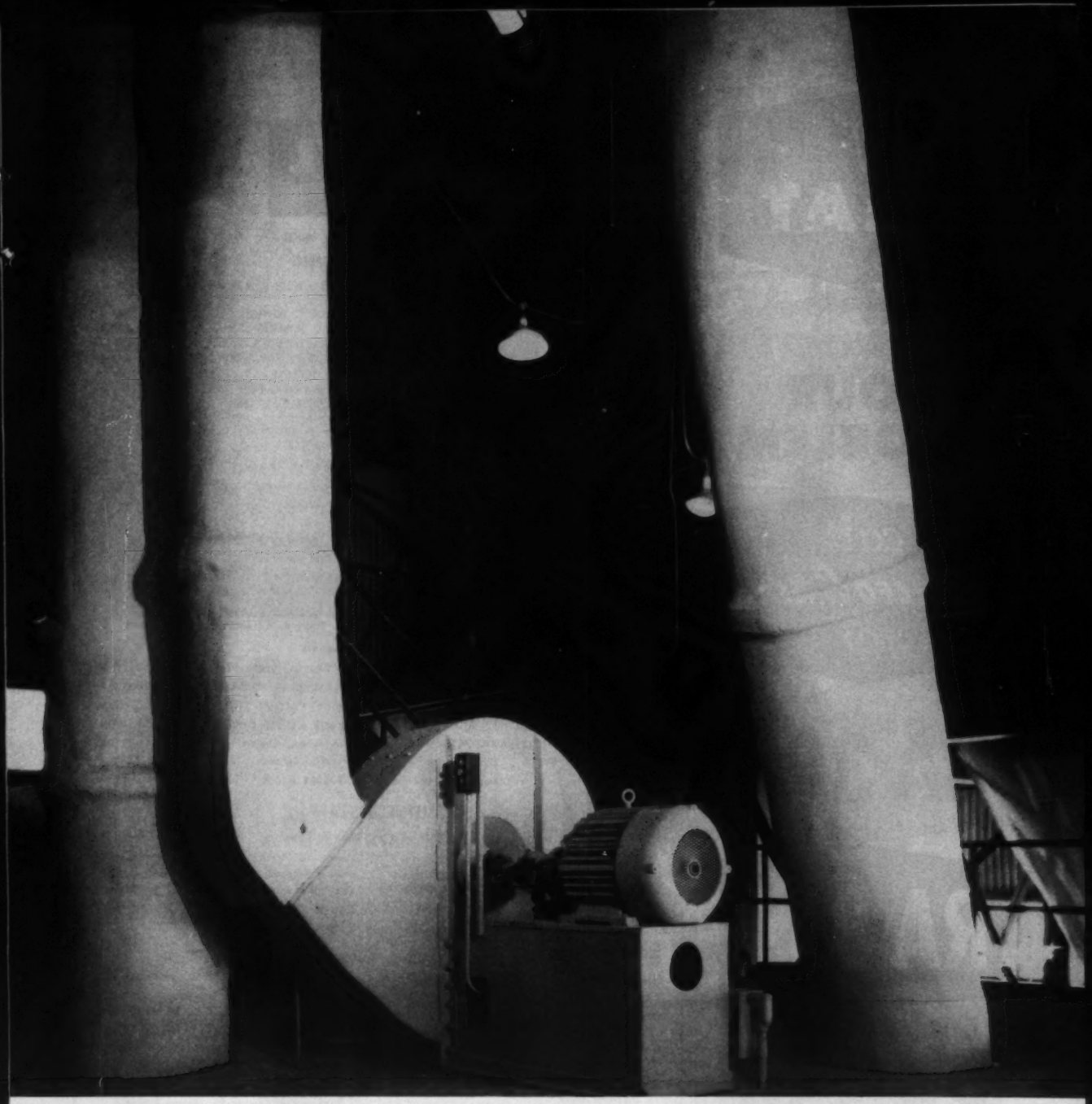

CENTURY MOTORS DRIVE PULVERIZING MILL VENT FANS

At a plaster board plant in Georgia, Century motors are providing dependable power to drive two large vent fans on roller-type pulverizing mills. The mills crush walnut-sized rock into talcum-like powder for the manufacture of dry-wall panelling and plaster.

Two Century 30 horsepower, totally enclosed, fan-cooled motors drive the vent fans. These fans provide critical air circulation for separating air from the finely-ground powder in the cyclone. The high reliability of the Century TEFC motors helps insure the availability of these important vent fans.

For applications where abnormal quantities of dust, grit, oil or chemical fumes are present, Century TEFC motors are ideal. Their totally enclosed, fan-cooled feature makes them dust-proof, cuts maintenance costs.

Century Electric application engineers have years of experience in applying the right motor for the job. This is your assurance of getting *more* than just a motor.

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NEW GISHOLT 3F FASTERMATIC WITH *FeeDial* CONTROL

IN JUST 15 MINUTES!

...then set your tools and take your trial cuts. That's how fast and simple it is to set up the new Gisholt MASTERLINE 3F FASTERMATIC Automatic Chucking Turret Lathe!

Only 15 minutes to pre-select feeds, speeds and functions—Now the desired feed rate is individually selected for each tooling station by turning a dial control. Selection of spindle speeds and machine functions is equally fast—just flick toggle switches. You do it all in just 15 minutes.

Completely automatic—But your savings don't end with fast setup. The automatic cycle assures consistent quality at fixed production rates. Any operator, even a new man, can chuck the work, start the cycle and remove the finished part. He has ample time to handle another machine.

What's more fast setup makes the new 3F pay off big on machining small lots—25 to 50 pieces—as well as long production runs. Contact your Gisholt Representative, or write us.

Send for literature—Ask your Gisholt Representative to show you how this new 3F with *FeeDial* can cut costs on your work.

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Please mail me your 36-page, full-color booklet, "Home Owner's Guide to Better Living."
Name
Street and number
City
Zone
State

Look for this **new** 4-color ad in...

Saturday Evening Post April 16	30,000,000 readers
Better Homes & Gardens May	18,000,000 readers
The American Home May	12,000,000 readers
Total:	60,000,000 readers

Unusual tear-out coupon offers new aluminum products booklet

advertising that works for you!

New Spring promotion by Aluminium Limited

sets its sights on 60,000,000 prospects for aluminum products—more than ²/₃ of the nation's homeowners

Plus an exciting new 36-page booklet written and illustrated for your dealers or customers to use at the retail level

Read how you can tie in to both parts of the program

Here's sales help where it counts . . . right at the retail level . . . a campaign created to seek out the homeowners who have an immediate interest in the aluminum products made by you and your customers.

In big, full-color spread advertisements in THE SATURDAY EVENING POST . . . BETTER HOMES & GARDENS . . . and THE AMERICAN HOME the campaign features your fast-moving Spring items—aluminum building products.

Again—as in Aluminium's successful Fall promotion which drew over *one hundred thousand inquiries* from every part of the nation—there is an attractive booklet offer. This time a new 36-page booklet, "Homeowners Guide to Better Living . . . with Aluminum."

The booklet has been prepared for use by you or your customers at the consumer level. Written in interesting, editorial style—it's a sales tool you'll be proud to use. Dealers can use it for more effective, more personalized selling! As an attention getter! Door opener! Mailing piece! A professionally conceived promotion piece for give-away at the point of sale!

Send the coupon today! We'll send you information on how you can get personalized copies of the booklet. We will also send you the new Spring promotion kit that ties your dealers in to this national advertising aimed at two-thirds of your homeowner market.

SEND COUPON TODAY... FOR FACTS ON NEW BOOKLET OFFER AND NEW SPRING PROMOTION KIT

Aluminium Limited Sales, Inc.
630 Fifth Avenue
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Gentlemen: Kindly tell me how I can get copies of your new 36-page booklet, "Homeowners Guide to Better Living . . . with Aluminum" along with a copy of the new Spring promotion kit.

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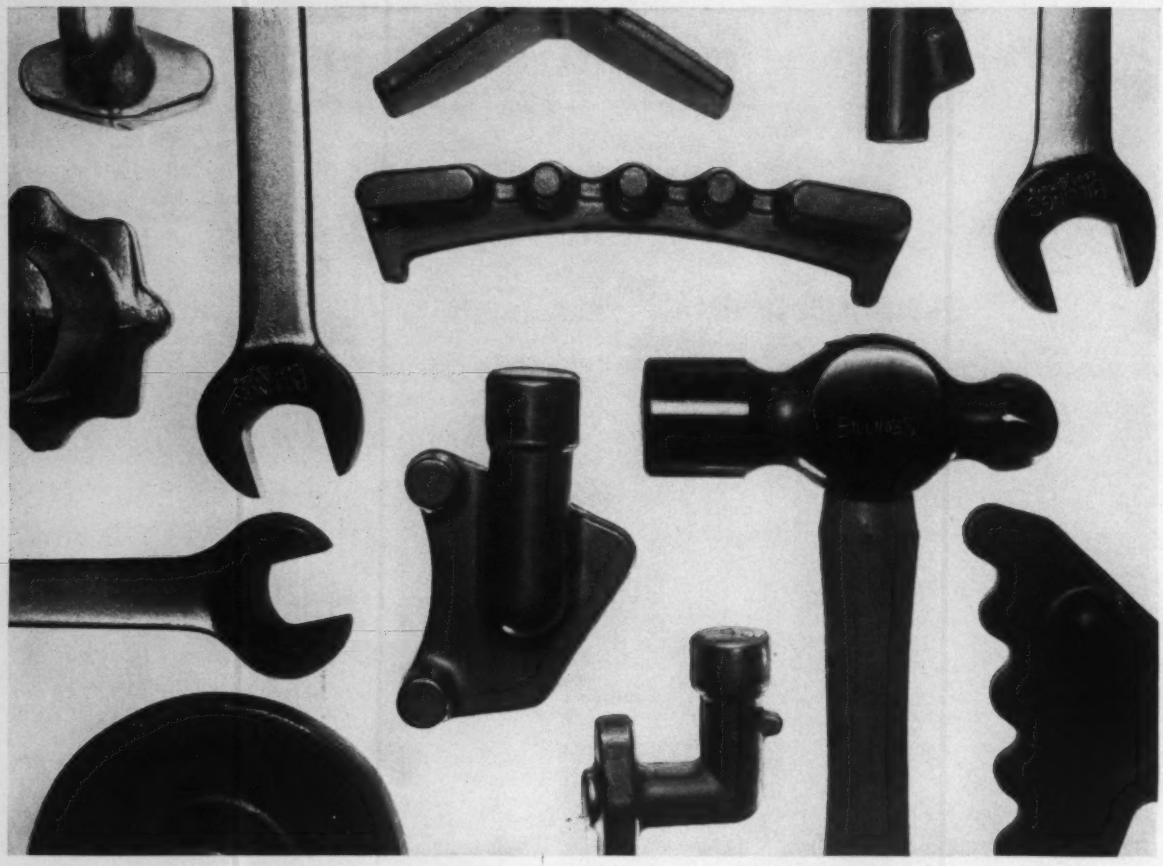


The Billings & Spencer Co. produces hundreds of quality forgings daily—from aircraft and missile parts to hand tools. Speedomax H temperature control helps hold rejects to a minimum.

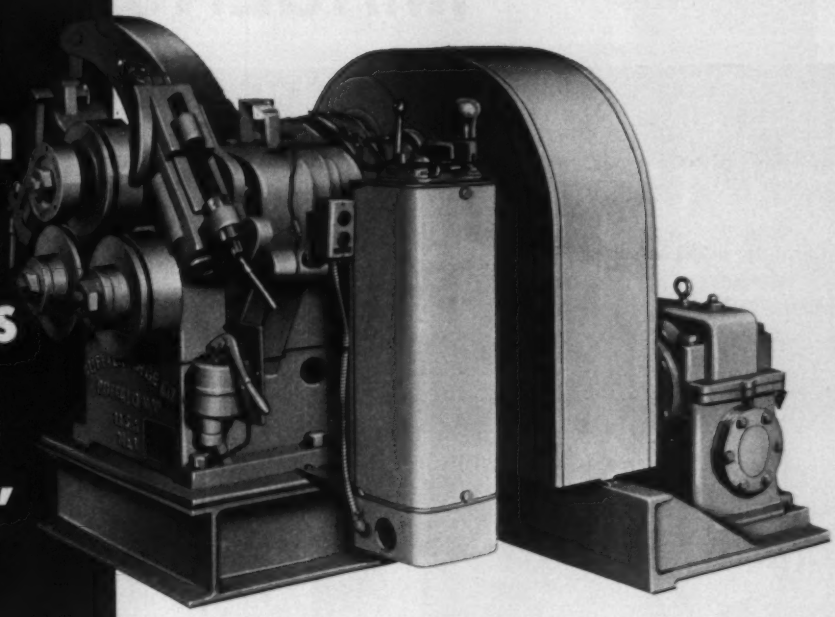
Control of forge fires improves profitability...

. . . at The Billings and Spencer Co., Hartford, Conn., where Speedomax® H controllers are providing the right temperatures for a variety of forgings, ranging from mechanics' hand tools of carbon and low alloy steels, to aircraft and missile parts made of today's modern high temperature alloys. The combination of precise temperature control, good furnace design and good forge-shop practices has not only reduced rejects . . . it has saved fuel and greatly improved furnace life. Rugged, compact and completely reliable, Speedomax H is providing similar benefits for numerous other heat treat operations . . . is helping both to modernize production, and to produce a quality product. *Whatever your heat treat, it'll pay you to investigate Speedomax H!* For details, contact your nearest L&N office, or write 4957 Stenton Avenue, Philadelphia 44, Pennsylvania.

Unaffected by either high ambients or continuous vibration, Speedomax H provides dependable, uninterrupted regulation of forge temperatures.

LEEDS NORTHRUP
Instruments Automatic Controls • Furnaces

Put Your Production Bending Operations "IN THE BLACK"



with BUFFALO BENDING ROLLS

These fast, accurate, dependable machines quickly bend circles, segments and spirals. They handle angles, rounds, squares, tubes, beams, channels, flats and special shapes. Easy roll changes eliminate need for expensive dies. Hydraulic top roll adjustment saves setup time.

Like all Buffalo products, Bending Rolls are quality engineered and built throughout. Unique speed reducer eliminates gearing, delivers more power in compact space.

Exclusive Buffalo "Leg-In" Attachment simplifies bending of angles leg-in. Saves time because work will not twist or get out of square. Acts as a gauge when rolling a run of circles to same diameter.

The complete line of Buffalo Bending Rolls includes models and sizes to handle all types of work. The model you need could be saving you production and maintenance dollars **right now!** For full details call your Buffalo machine tool dealer, or mail coupon today.

"Buffalo"

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158 Mortimer Street • Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

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Please send complete literature on Buffalo Bending Rolls.

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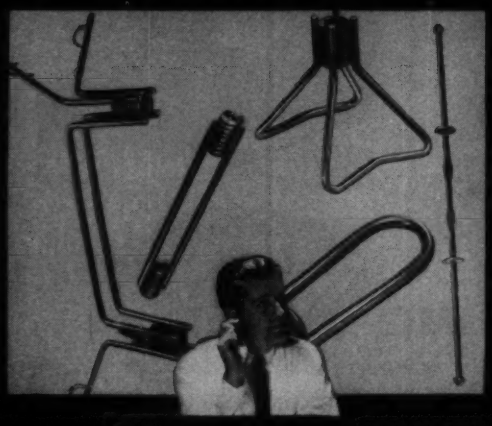
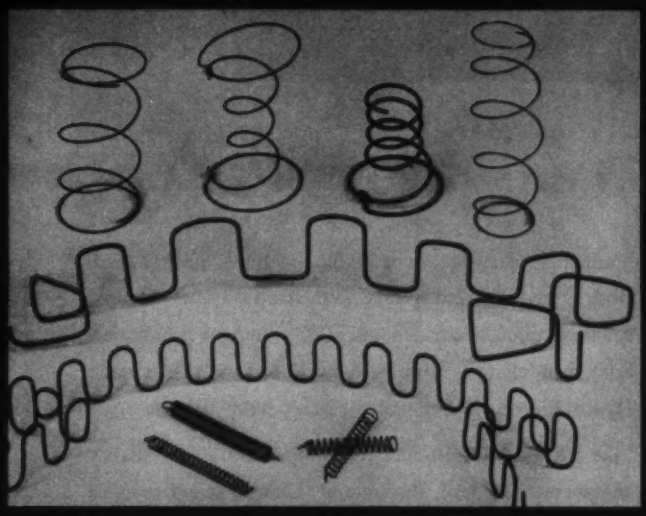
IMAGENUITY IN WIRE





Imagine wire of consistently uniform quality that assures accurate, easy forming with adequate strength and toughness to meet the most difficult design and forming problems.

That's Republic Steel Wire—strong, ductile, tough—available in many types and in a wide range of gages and physicals for almost any product you can imagine.

The variety of products illustrated above are examples of "imagenuity in wire"—engineering imagination plus modern business ingenuity. Fabricators of these products use:

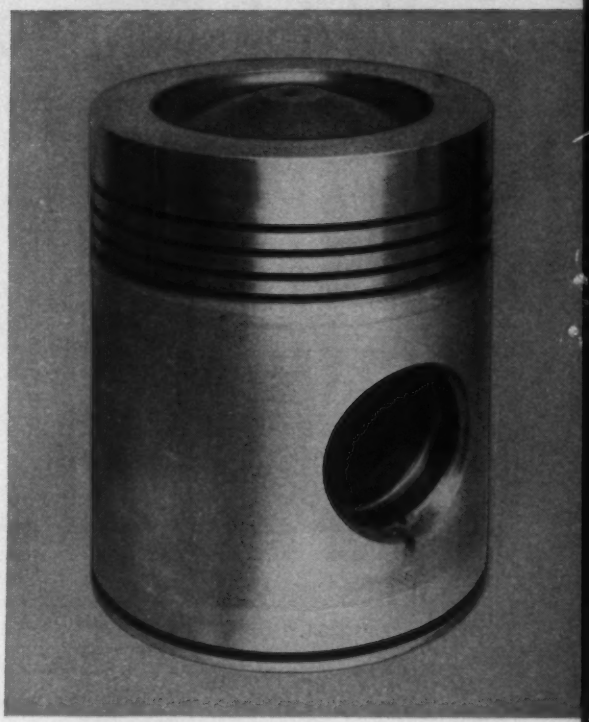
1. Republic Manufacturers' Coarse Wires to step up production, minimize losses, increase the salability of their products. Box Binding and Stapling, Garment Hanger, Brush Handle, Chain are a few of the qualities regularly produced by Republic for manufacturers of concrete reinforcing specialities, fan guards, plated shelves, racks, and grilles.

2. Republic Spring Wire for outstanding performance in automotive seat and back cushions, furniture, bedding, and mechanical spring applications. Standard High Carbon Spring Wire and MB High Carbon Wire are produced by experts who know and understand both steelmaking and high carbon wire drawing practices. They know spring forming machines and the importance of physicals, finish, cast and size accuracy.

3. Republic Screw, Rivet, and Heading Wires to meet the most exacting demands of modern upsetting, roll threading, and extrusion machines. Republic Wire is specially produced to assure internal soundness and freedom from injurious surface defects. It flows freely. Fills out dies in difficult upsetting operations.

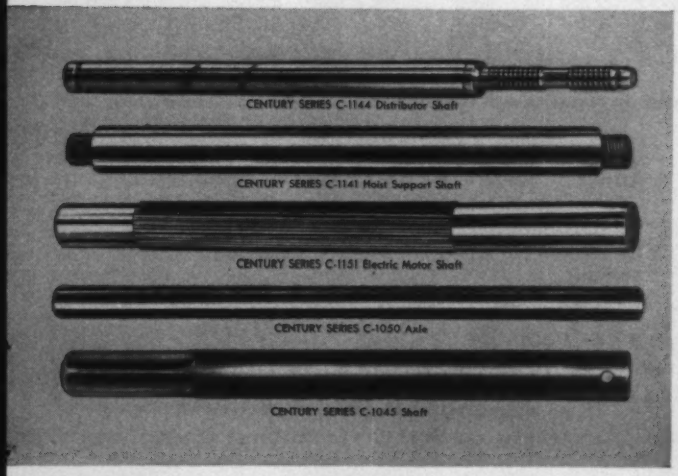
Republic Wire Metallurgists are ready to assist you in selection, application, and processing. They investigate the desired end use—your problems of quality, yet low-cost, quantity production—then suggest a specification to do the job. The coupon is your invitation to use this obligation-free service. Mail it today.

IMAGENUITY IN ALLOY STEEL enabled Convair engineers to increase strength of major structural components in the 880—world's fastest jet airliner. In each 880 pod-pylon, rear engine mount of alloy steel grips and supports the powerful jet engine. Republic Alloy Steels offer exceptionally high strength/weight ratios with the highest strength values. Uniform response to heat treatment assures complete deep hardening penetration, plus hard, wear-resistant surfaces. Send coupon for more facts.



IMAGENUITY IN PIG IRON resulted in the development of ductile iron diesel engine pistons with nearly double the service life of aluminum pistons. Using Republic special low manganese Chateaugay Pig Iron as the base metal, Hunt-Spiller Manufacturing Corporation successfully designed and produced a diesel engine piston with high mechanical strength, minimum weight, maximum wear- and heat-resistance, low ultimate cost. Chateaugay's high total carbon and unusually low phosphorous, silicon, and manganese content suit it perfectly for ductile iron use. Inherently excellent physical properties are maintained in the ductile form assuring strong, flaw-free castings accurate to patterns and shapes. Send coupon for full facts.

IMAGENUITY IN COLD FINISHED STEEL BARS by Republic metallurgists and machining specialists resulted in development of the CENTURY SERIES. A family of five grades of cold finished, specially processed, stress relieved bars having a minimum yield strength of 100,000 psi, the CENTURY SERIES meets the needs of steel parts producers requiring high strength with varying degrees of machinability, and on a descending price scale. Available from Republic in C-1144, C-1141, C-1151, C-1050, C-1045. Mail coupon for your free copy of booklet describing how the CENTURY SERIES can save you time and money in steel parts production.


CENTURY SERIES C-1144 Distributor Shaft
CENTURY SERIES C-1141 Hoist Support Shaft
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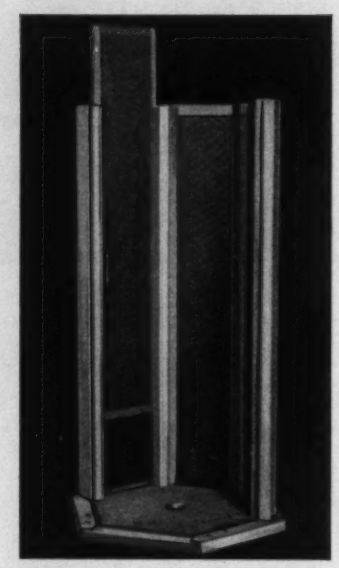
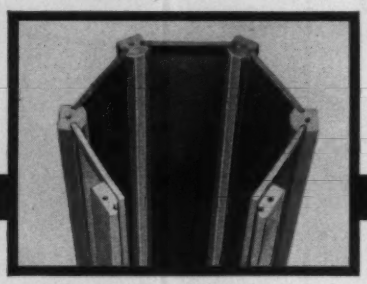
City_____ Zone____ State_____

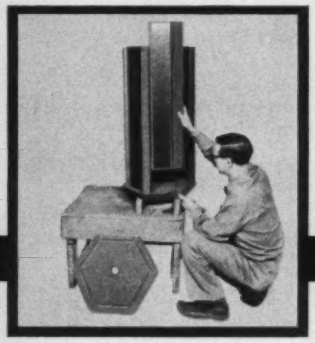
YOU GET SIX BIG BARREL BENEFITS with this new Udylok-Tempron assembly

A plating cylinder so simple in construction . . . you can count on its long life expectancy and repair any damage with ease.

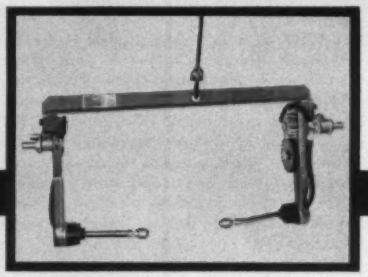




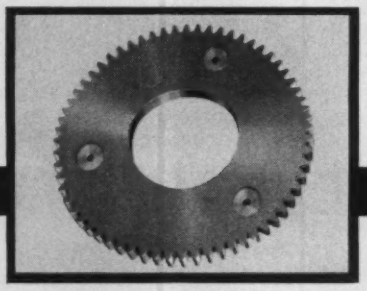
NEW INTERLOCKING CONSTRUCTION—No corrodible tie rods to rattle, work loose or get in the way . . . no old fashioned cemented joints. Exclusive interlocked rail and joint construction employs just 12 parts . . . no metal that will plate up in the entire cylinder unit.



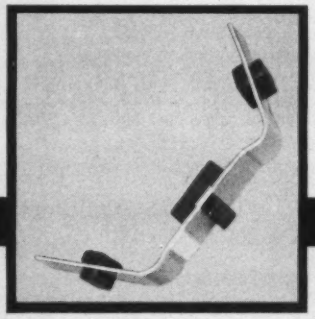
NEW FIELD REPAIRABLE DESIGN—Standard parts are available from Udylite stocks, or you can stock spare parts and make your own repairs easily and rapidly with just a hammer and screwdriver . . . return cylinders to production in minutes.



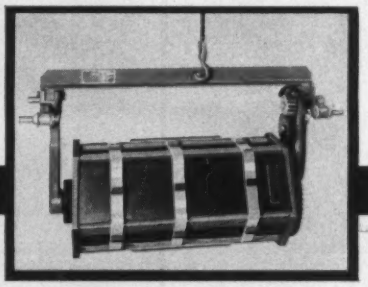
NEW UDYBILT SUPERSTRUCTURE—Combines new principle, dependable 4 saddle positive contact with 3 point suspension . . . never any misalignment . . . no arcing . . . gears are always in mesh . . . no jumping. Can be used with old style cylinders and in your present tanks.



NEW UDYLON RING GEAR—New four pitch gearing provides greater-than-ever strength and durability. It's super corrosion resistant . . . will not plate up . . . inert to all solutions. *New low list price, too.*



NEW FIBERGLASS DOOR CLAMPS—Special epoxy-fiberglass composition . . . engineered for extra strength . . . they're flexible, lightweight, impervious to heat, cold and corrosion. NO METAL PARTS. Nearly indestructible, even under abuse.



HIGH WORK LOAD and current capacity. Easy to repair, economical in initial cost and maintenance, the Udylok assembly is loaded with buyer benefits. When you switch to Udylok in your plant you make the perfect economy move.

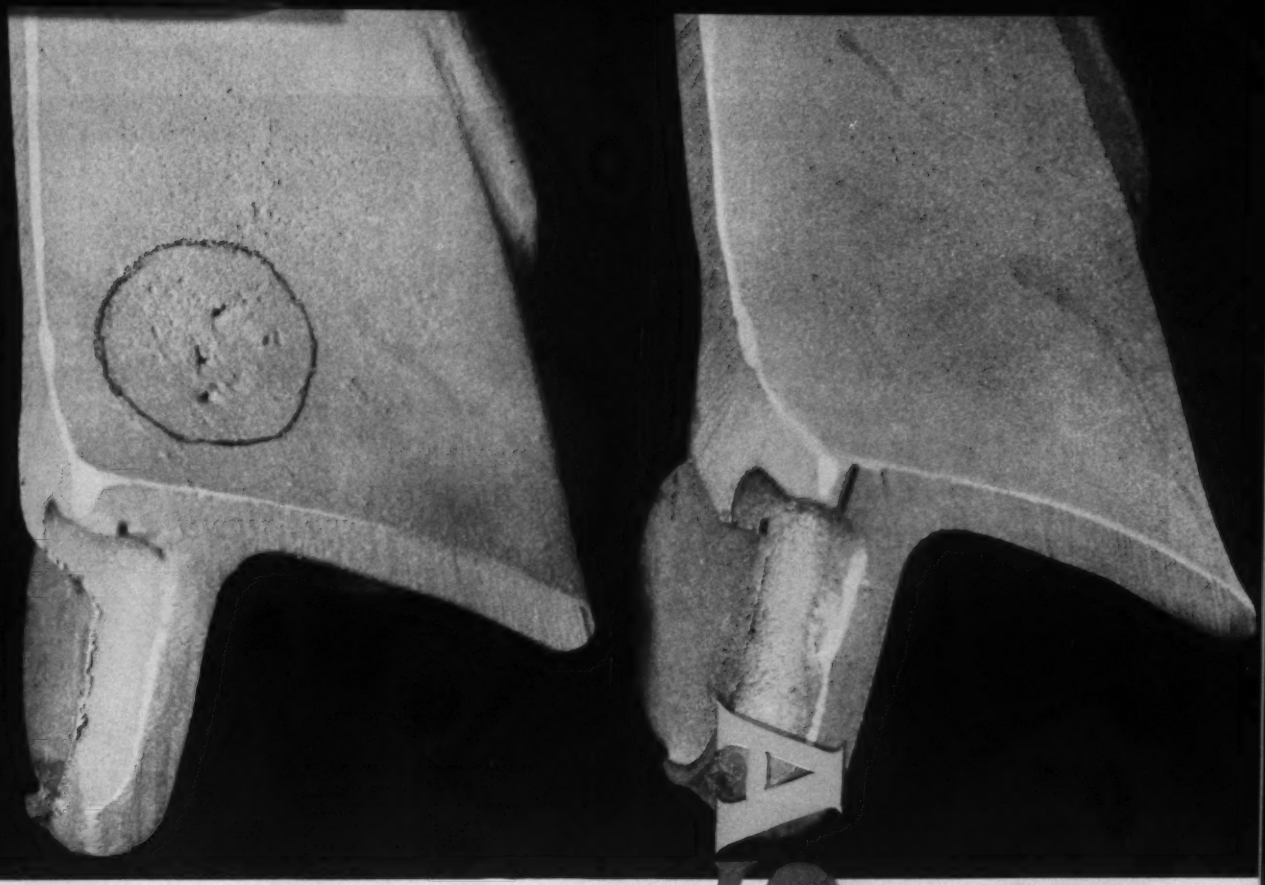
NEW BELT DRIVE . . . Udylok is also available with an improved belt-drive-hanger. For additional information about either model, consult your Udylite man today or write:

the **udylite** **corporation**

detroit 11, michigan

world's largest plating supplier

on the west coast the: **L. H. Butcher Company**



Now ASARCO process reduces and controls shrinkage

FEDERATED PT (pressure-tight)
ALUMINUM CASTING ALLOYS

Use PT-processed metal instead of any of the standard sand and permanent mold aluminum casting alloys. Result: no unpredictable shrinkage. No need for extra gates and risers. Higher yield per pound of metal. More uniform pressure-tight castings. A brighter cleaner surface. All the same physical and mechanical properties and characteristics. Write or call today for full information about PT grade aluminum, to Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, RE 2-9500; or call your nearest Federated sales office.

Comparative photograph illustrates the effect of PT treatment. Casting on left from standard aluminum alloy, shows typical shrinkage over a large area. Compare with casting on right, cast in PT grade, under the same conditions! Alloy: F460 (319)

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

FEDERATED METALS DIVISION

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WHITING, IND. (CHICAGO)
Whiting: Whiting 826
Chicago: Essex 5-5000

IN CANADA: Federated Metals Canada, Ltd.
Toronto, Ont., 1110 Birchmount Rd., Scarborough, Phone: Plymouth 73246

Montreal, P.Q., 1400 Norman St., Lachine, Phone: Melrose 7-3591

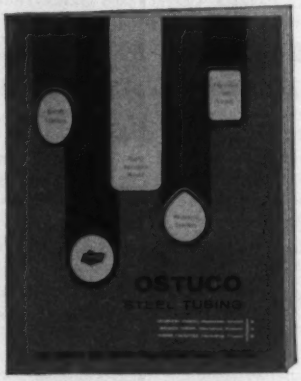
How are they doing down on the farm?

Nowadays they're doing everything a lot easier, thanks to modern power-operated farm machinery.

And farm machinery producers have learned that their lot can be a lot easier, too, when they specify Ostuco Tubing. That's because there's no compromising with custom-quality Ostuco Tubing. Consistently you receive the exact tubing you want — the size, length, grade — with the strength and tolerances you need. For machined parts, you get our recommended rough size guaranteed to clean up.

In addition to these advantages, Ohio Seamless will fabricate tubular parts to your specification. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.

A-1358A



Complimentary Copy of new Bulletin CS60 "Ostuco Steel Tubing" sent on request.

Model illustrated built to 3.5 mm scale.

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Division of Copperweld Steel Company • SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

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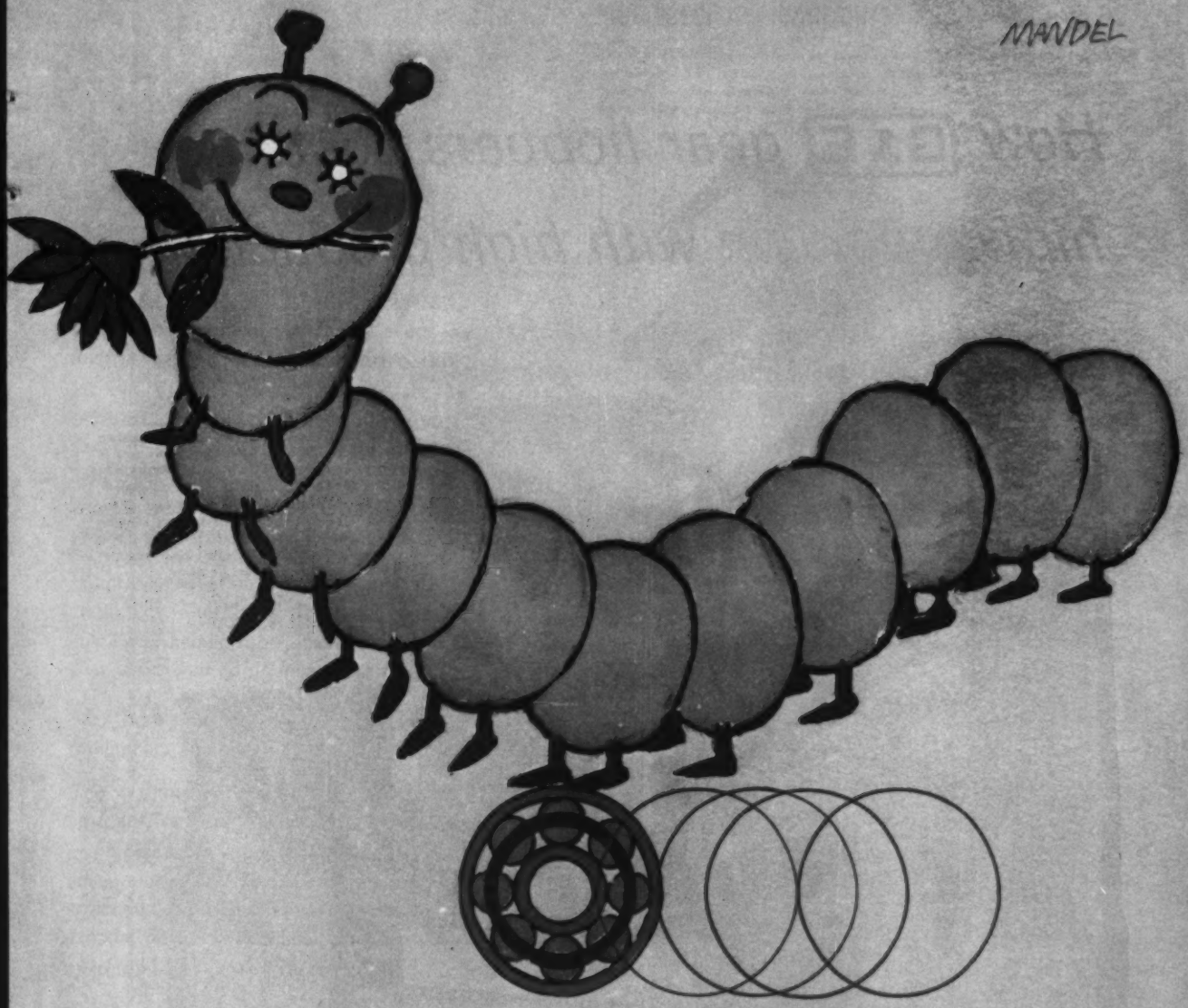
Canada: Railway & Power Engr. Corp., Ltd.

Export: Copperweld Steel International Company, 225 Broadway, New York 7, New York



SMOOTH RUNNING

A bearing that turns with the greatest of ease is the bearing that's always certain to please (if you'll pardon our breaking into rhyme). And here at Federal we know that if a finished ball bearing pleases *us*, it's bound to please you. That's why Federal inspectors are such holy terrors when bearing parts reach their quality control points. And if the parts get through, the assembled product is sure to be a ball bearing that will purr sweetly—now and practically ad infinitum. So the next time you want to smooth out a rough anti-friction problem, let Federal Ball Bearings do it for you. You'll find over 12,000 ball bearing sizes and hundreds of types in our catalog. Send for it today.

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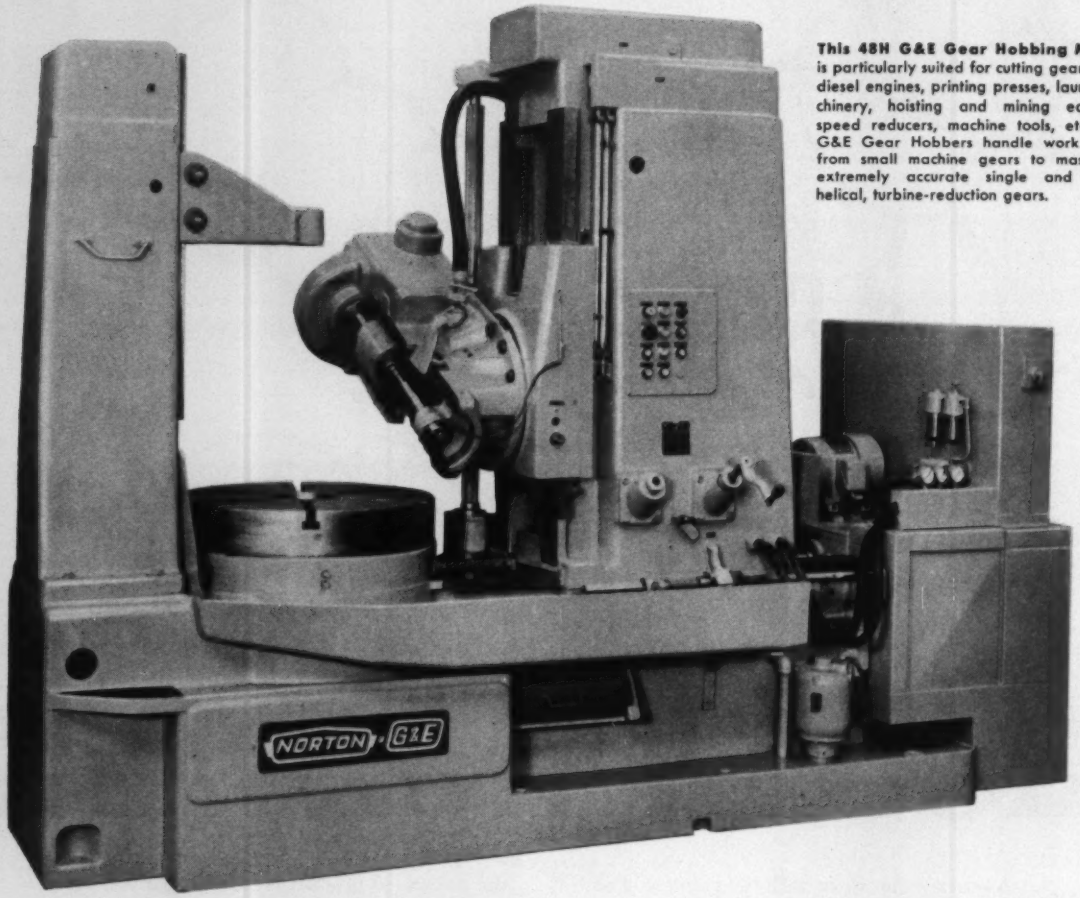
BALL BEARINGS

One of America's largest ball bearing manufacturers

FEDERAL ON FILM—A 16 mm. color sound film takes you through our 400,000 sq. ft. plant. Loaned free. Just ask for it.

How G&E gear hobbers combine high precision with high production...



This 48H G&E Gear Hobbing Machine is particularly suited for cutting gears used in diesel engines, printing presses, laundry machinery, hoisting and mining equipment, speed reducers, machine tools, etc. Other G&E Gear Hobbers handle work ranging from small machine gears to massive yet extremely accurate single and double-helical, turbine-reduction gears.

for your high profits

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Gould & Eberhardt Universal Gear Hobbing Machines meet practically every industrial gear cutting requirement. Built for fast, dependable performance, they're established cost-cutters for rapid production of spur gears, single and double-helical gears, sprockets, splines, worm gears, worms, ratchets and special forms — in a wide range of pitches and diameters.

Highest production at lowest hob cost is assured by the highly developed vertical cutting principle, substantial hob support, gear trains and adjustment features.

And here's a fact it will pay you to remember:

The original productivity and accuracy built into hobbers by G & E is maintained at highest levels — and with every possible advancement — by the assimilation of G & E experience and personnel into the progressive and modern machine tool building operations of Norton Company.

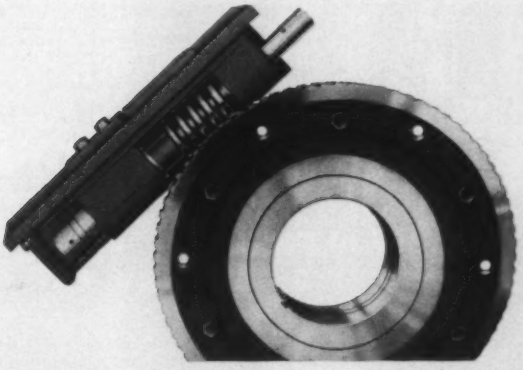
For careful help in selecting Gear Hobbers or other G & E equipment that will benefit your production see your G & E dealer or write to Norton Company, Gould & Eberhardt Division, Worcester 6, Massachusetts.

NORTON
MACHINE TOOLS

75 years of . . . Making better products
. . . to make your products better

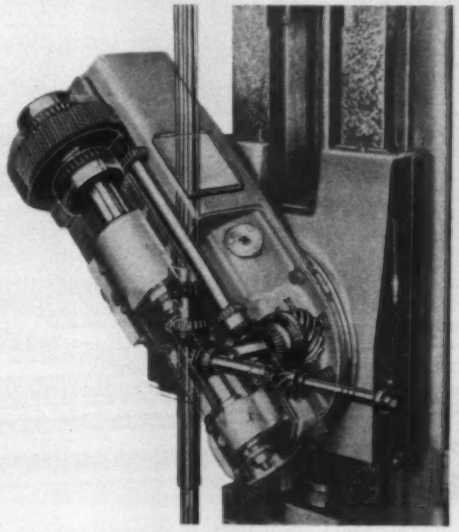
HIGH PRECISION HIGHLIGHTS

Vertical Feed. Optimum accuracy is secured by a large diameter feed screw, precision-cut in a temperature-controlled laboratory and rigidly anchored in tapered, preloaded precision roller bearings. Backlash control is maintained by an easily adjusted two-piece bronze feed screw nut.



Indexing. DUALEAD® worm-gearing assures accurate indexing under heaviest production. The worm thread, with progressive variation throughout its length, simplifies adjustment by providing backlash control without change of center distance and insures uniform transmission of motion in both directions of rotations through proper conjugate tooth action, thus maintaining accuracy of index under high operating speeds and over an extended period.

The maximum wear-resistance quality of the mating chill-cast nickel bronze DUALEAD index worm gear results in minimum wear to maintain extreme accuracy longer.



HIGH PRODUCTION HIGHLIGHTS

Rapid, Precise Hobbing. Speed and accuracy for sustained high production rates — as well as extra-long service life of hobs and machines — are assured in G & E Hobbers because:

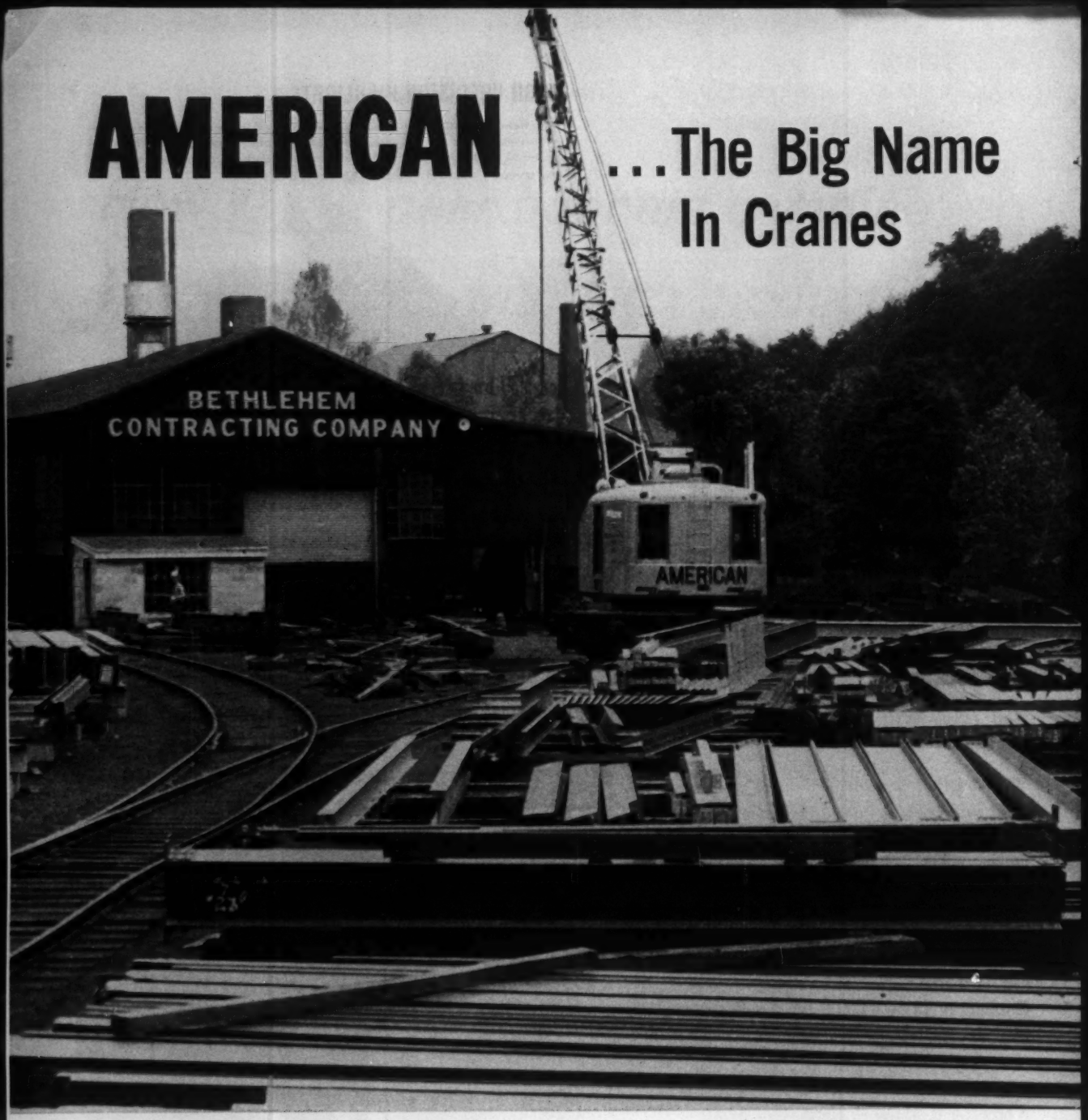
. . . The heavily proportioned, easily adjusted hob slide travels on double rectangular guides for sustained accuracy in basic motion.

. . . The single-helical final-drive gear to the hob is independently mounted on large antifriction bearings to prevent compounding stresses on the hob spindle.

. . . The fixed-position work table is located in a large tapered bearing and supported by a flat annular bearing to absorb cutting stresses.

. . . The hob arbors are heat treated and chrome plated to reduce wear and eliminate the tendency to raise burrs which cause eccentricity and hob wobble.

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners



Write for detailed, illustrated information showing how versatile American Truck and Crawler, Self-propelled and Locomotive Cranes (American DiesELectric,® above) are engineered to give you trouble-free, high volume materials handling service.

AMERICAN HOIST
and Derrick Company
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EXCAVATORS-CRANES to 2 yds.-60 tons
LOCOMOTIVE CRANES to 130 tons

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Forged fittings for wire rope-chain

RW-300

the most field-reliable computer control system . . .

FOR AUTOMATIC CONTROL IN STEEL MILLS

Applied to the operation of a blast furnace, RW-300 digital computer control can result in a 2 to 4 percent increase in production rate or decrease in coke consumption. Measured over a year, such improvements in the return from *one* furnace can equal the investment in an RW-300 system. Similar cost reductions and production increases can be realized through computer control of sintering plants, open-hearth furnaces, oxygen converters, rolling mills, annealing and plating lines, and other processes in existing or new steel mills.

In an effort to boost profits by reducing costs and increasing throughput, many leading steelmakers are now considering computer control, and uppermost in their minds is the question of system reliability proven in the field. More than a dozen RW-300 systems are now operating around the clock in rugged industrial environments.

For further information, call or write Mr. Raymond E. Jacobson, Director of Marketing, Dept. S-1076-1.

THE THOMPSON-RAMO-WOOLDRIDGE PRODUCTS COMPANY

a division of ***Thompson Ramo Wooldridge Inc.***

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A Borg-Warner QUALITY-RATED Crane

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For a 3-ton, 34 ft. Span (with 5' overhang each end) Underhung, Motor Driven Industrial Service Crane

The ideal crane for your pre-engineered steel frame buildings.

Here's a crane that's tailor-made for the popular pre-engineered, steel frame building. Overhang at both ends of the bridge beam permits installation for maximum hook coverage with greatest height under the hook in this type of building. And, "Borg-Warner QUALITY-RATED" is your assurance of maximum performance, reliability and long life.

If you are planning a plant addition, a new plant or modernization of existing facilities, it will pay you to get complete information and costs on Borg-Warner QUALITY-RATED Cranes. There's a type and size to suit your needs.

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- √ Precision ball and roller bearings throughout.
- √ Channel outrigger with welded diagonal bracing.
- √ Totally enclosed crane and hoist duty motors.
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A maximum value at $3990.00

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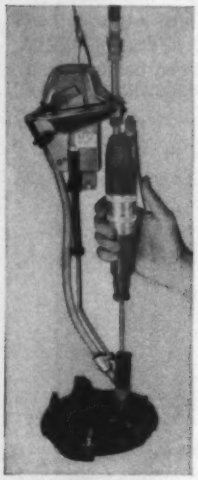
We're all going to STRIPPIT this year!

For a fresh slant on ways to work metal, be sure to see our machines in action at our booth. See how our self-contained punching units eliminate expensive dies, how the Flex-O-Drill sharply reduces template-making time, how our versatile Fabricators simplify pilot and production runs. If you can't make the show, write for General Catalog.

Stop at Booth 1221 ASTME Show April 21-28

SELF-CONTAINED HOLE PUNCHING UNITS reduce tooling to a simple assembly operation. Punches, stripping guides and die buttons are component parts of the unit. Nothing's attached to press ram. No die set required!



STRIPPIT ZIPP SCREW FEEDER feeds and drives all kinds of screws automatically, saves time and trouble on continuous vertical screwdriving operations.

STRIPPIT SUPER "30" FABRICATOR, a 30" throat version of well-known Model 15A. Handles sheets 30" wide for short run punching, 25" x 30" for production hole duplication. Maximum hole sizes: 3½" in 16 ga. and ½" in ¼" mild steel.

STRIPPIT FLEX-O-DRILL speeds production of accurate templates and layouts. A table-type precision machine for drilling, reaming, center punching and scribing. Flex-O-Drill does away with need for base-line or vernier height gauges. Handles ¼" mild steel up to 24" wide and in any length.

WALES **STRIPPIT** INC.

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Customer reports confirm...

CF&I Wire Packaging increases production, eases handling

In instance after instance, all across the country, manufacturers have reported cutting hours off daily downtime, easing storage and handling problems... *increasing production as much as 50%*... after they started using CF&I Steel Wire — Packaged for Your Production.

This is possible because all CF&I Wire is packaged specifically to give you one, or a number of special production or handling benefits. Several typical statements describing users' production benefits are reported here.

CF&I, the pioneer in wire packaging, makes wire in a wide range of gages and finishes. Whatever your needs, CF&I can fill them. Call your local CF&I sales office for full details on the Wire Packaged for Your Production.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

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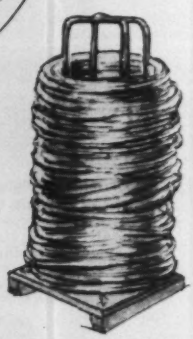
PACKAGED for YOUR PRODUCTION

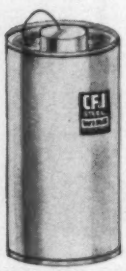


DISPOSABLE STEM-PAKS®
Capacity—500-1000 lbs.

Customer Report—
"50% increase in production since we started using Stem-Paks."

DISPOSABLE SPOOLS
Capacity—5-70 lbs.

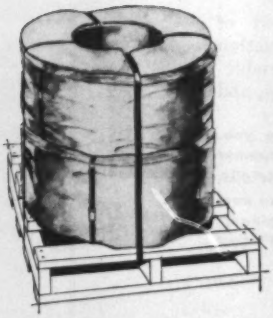
Customer Report—
"Easy to handle and store... quick to put in operation."



FIBRE DRUMS
Capacity—250-600 lbs.

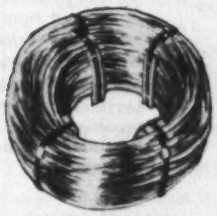
Customer Report—
"Wire protected from dust, rust and corrosive fumes. Easier handling, storage, inventory."

RETURNABLE SPIDERS: Capacity — 2000-3000 lbs. Customer Report — "25% increase in production, 20% less downtime and 80% less scrap loss with the long, uninterrupted pay-off of these returnable spiders." CF&I produces top quality wire in thousands of different types, sizes, shapes and finishes to meet all types of wire applications.



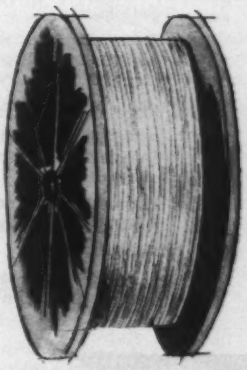
REEL-LESS CORES
Capacity—800-1000 lbs.

Customer Report—
"Easier handling, less storage problems and lower freight handling charges."



SHAPED COILS
Capacity—1500-2500 lbs.

Customer Report—
"20% increased production with longer runs, plus easier storage and reduced handling costs."



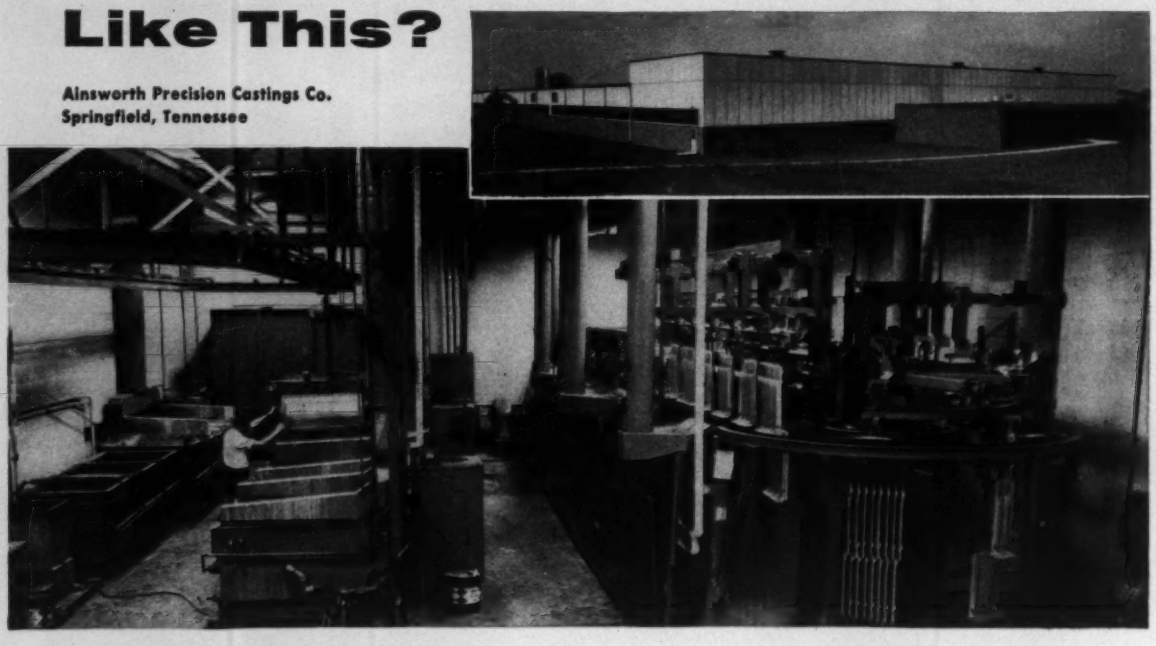
RETURNABLE STEEL REELS
Capacity—500-800 lbs.

Customer Report—
"Holds six times the wire as standard coils. Smoother pay-off, less scrap loss, easier shipping."

LOOK FOR THE DIAMONDS—SIGN OF FINISHING QUALITY

Can You Use Process Engineering Service Like This?

Ainsworth Precision Castings Co.
Springfield, Tennessee



Complete system for Zinc plating and Iridite—designed, fabricated, installed and serviced by Allied Research to turn out auto window channels, gear shift and directional signal components.

Here's what Allied Research did to give Ainsworth "Turn Key" service:

1. Planned the entire layout and operational details.
2. Recommended and presented complete cost analysis of processes, equipment and supplies necessary . . . and furnished them.
3. Reconditioned existing equipment and integrated it with new equipment to make the installation both economical and efficient.
4. Planned and constructed a complete waste disposal system for treating cyanide wastes.
5. Installed 14-station zinc-IRIDITE automatic, 12-station zinc barrel line, and a still line.
6. Set up procedures for regular qualitative testing of coatings and solutions.
7. Executed an extensive training program for operators.
8. Entire operation completed ahead of schedule even though overall construction was badly delayed by weather . . . production personnel merely turned the key, and started operations.

PROCESS ENGINEERING SERVICE can help you. Whether you require a single piece of equipment or a complete system. Write for complete details. Let us quote on your plans for renovation or new installation . . . call your Allied Field Engineer. He's listed in the yellow pages under "Plating Supplies".

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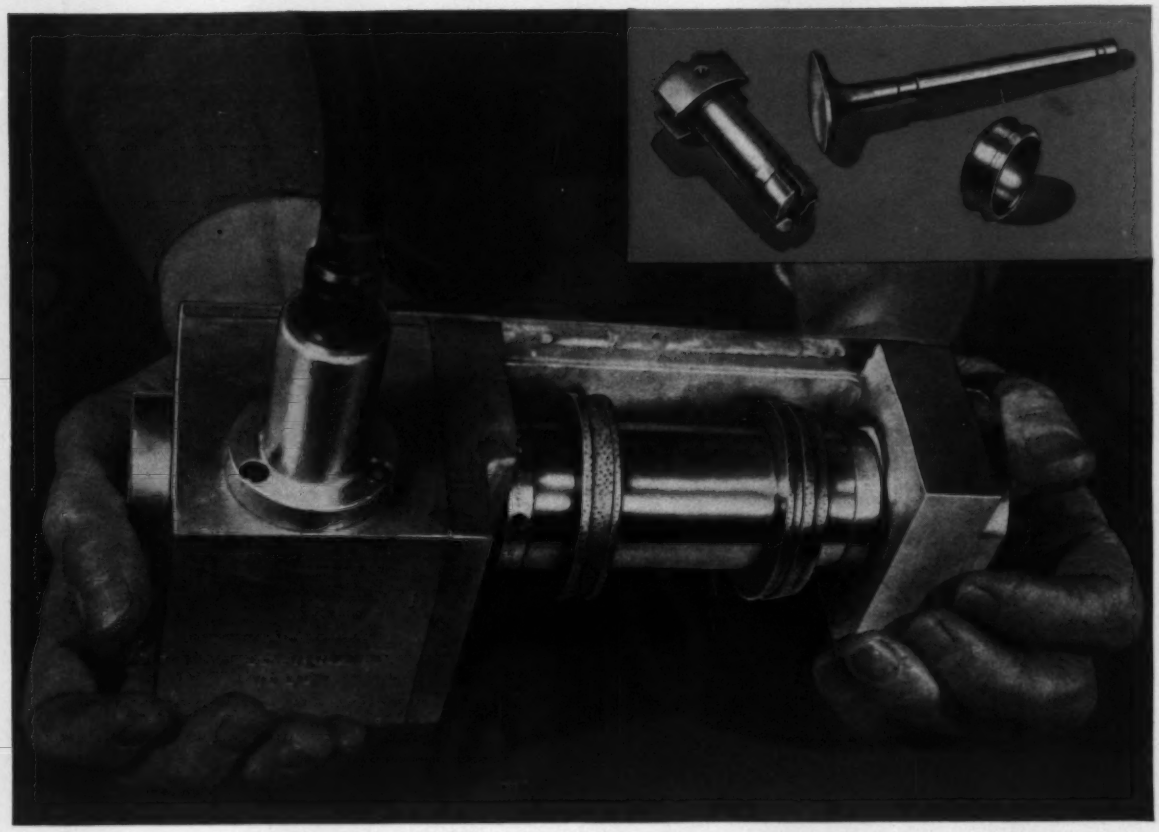
West Coast Licensee for Process Chemicals: L. H. Butcher Co.

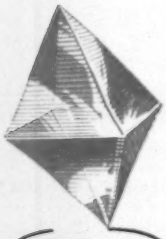
Chemical and Electrochemical Processes, Anodes, Rectifiers Equipment, and Supplies for Metal Finishing

IRIDITE® Chromates | IRILAC® Coatings | ISOBRITE® Brighteners | ARP® Supplies | WAGNER Equipment



THIS TRU-GRIT® ROTARY DIAMOND DRESSING WHEEL forms grinding wheels with speed, accuracy and economy unapproached by any other method

It form dresses ANY grinding wheel—vitrified, resinoid, silicate, rubber or shellac bond. It has none of the limitations of crusher roll or single point diamond tool forming; it develops complex configurations and sharp, deep, square grooves with absolute accuracy, assuring exact reproduction in the work piece. It may do this in a single, quick pass between ejection and loading, without interrupting the production cycle. Downtime for tool changing on every shift is out; the Tru-Grit Rotary Diamond Dressing Wheel's finishing and dressing life goes far beyond anything known before. Savings in downtime, the increased number of pieces produced, the lower cost per piece over the life of the Tru-Grit Rotary Wheel are things to make cost engineers take a second look. But, perhaps the most dramatic difference of all is in the meticulous accuracy, fine finish and routine uniformity of the processed pieces. This is what quality control engineers have dreamed about and it makes quality control reports something of a formality. If you'd like facts and figures on actual applications of the Tru-Grit Rotary Diamond Dressing Wheel, write us.



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WHEEL TRUEING TOOL COMPANY

1910 **SEMI-CENTENNIAL** *1960*

Main plant and office: 137-3200 W. DAVISON, DETROIT 38, MICHIGAN
Southwestern plant: DALLAS, TEXAS • Western plant: LOS ANGELES, CALIFORNIA
Eastern affiliate: WHEEL TRUEING TOOL COMPANY OF NEW JERSEY, BLOOMFIELD, N.J.
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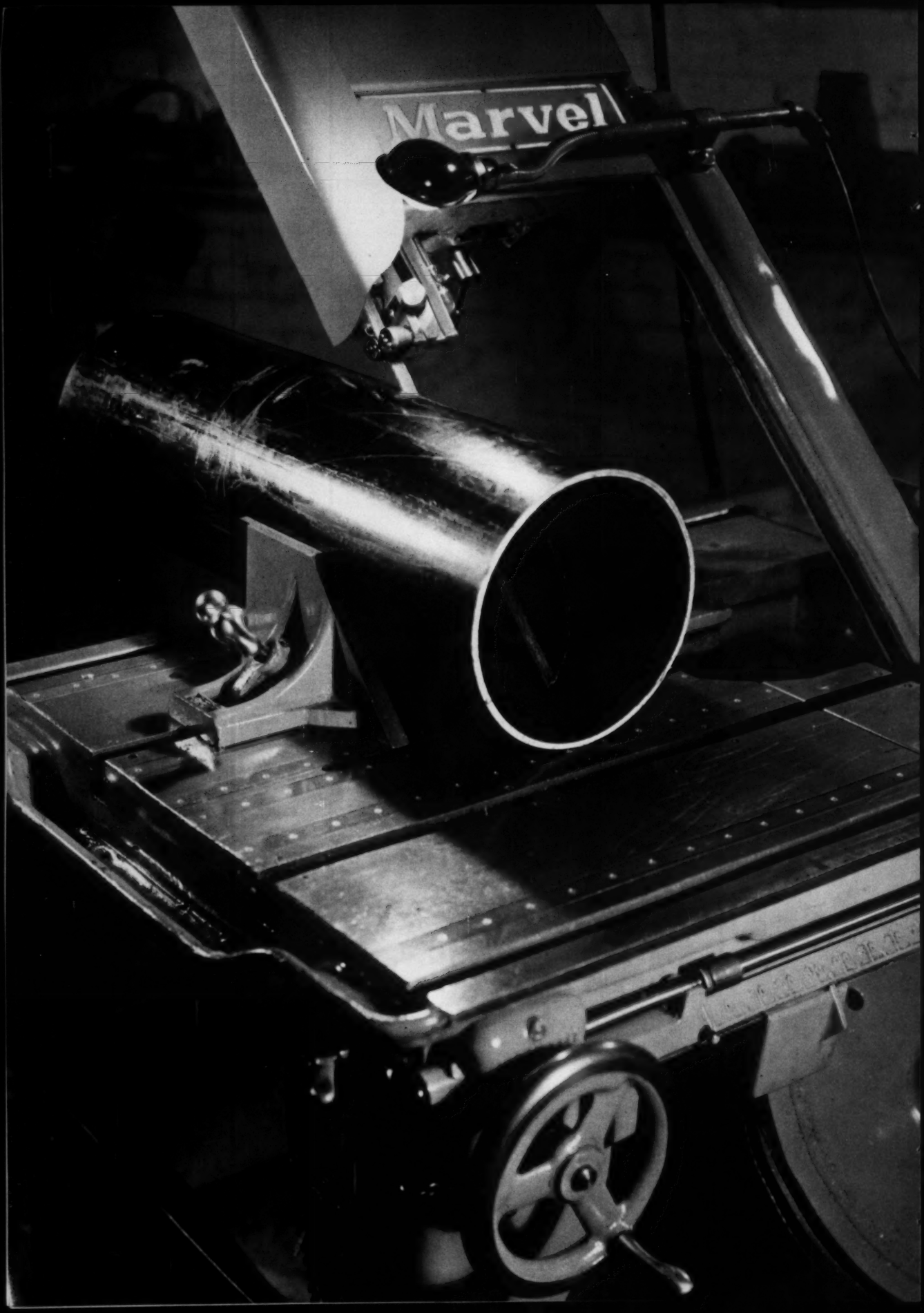
Oldest and largest diamond and diamond tool specialists in the Western Hemisphere

INDUSTRIAL DIAMONDS • DIAMOND TOOLS • DIAMOND-MISER TOOL TURNING DEVICES • MINING AND OIL FIELD DIAMOND DRILLS • MASONRY DIAMOND DRILLS AND SAWS • PORTABLE DRILLING MACHINES AND SAWS


Marvel

Problem:

One Straight Cut – *One Miter Cut*

Solution:

One MARVEL No. 8 Band Saw

Recently, a MARVEL Field Engineer was called on to help solve a troublesome production sawing operation.

He found that a straight cut and a 45° miter cut were required on a 10″ diameter pipe prior to welding it into an assembly. Production was slow, cutting costs were climbing to alarming proportions, and too many pieces were being rejected because one or both cuts were not meeting accuracy standards.

The trouble was easy to find. A makeshift arrangement was being used to do the job. After the straight cut was made, the miter was laid out and the pipe swung out into the aisle so that the saw could make the angle cut. Excessive work handling slowed production, valuable floor space was taken up, and accuracy became increasingly difficult to maintain.

Marvel No. 8
Universal
Metal Cutting
Band Saw

Capacity: 18″ x 18″

Recommending a MARVEL No. 8 Universal Band Saw solved the problem. When the MARVEL Field Engineer showed how the Saw's column and blade can be tilted up to 45° right or left of vertical and fed straight into and through the cut at the pre-determined angle *while the work remained stationary on the table*, the production superintendent recognized the answer to his problem. He also saw, how the built-in protractor would eliminate all layout.

Result: another MARVEL No. 8 Universal Band Saw went to work for a new user.

Cutting miters quickly and accurately is just one of a hundred jobs that can be done on the versatile No. 8 Universal Band Saw . . . the most useful—and used—metal cutting saw on the market. Get complete information on this time and cost saving band saw today. Write for Catalog 875.

MARVEL *Metal Cutting* SAWS

ARMSTRONG-BLUM MFG. CO.

5700 W. BLOOMINGDALE AVE., CHICAGO 39, ILL.

IT PAYS TO STANDARDIZE ON **STANSCREW**

Stanscrew service helps insure precision of *Gilbarco* pumps

Gilbert & Barker Mfg. Company builds its famous Gilbarco gasoline pumps for oil companies large and small, and ships them to every state in the union as well as to most countries overseas. To insure precision and dependability of these pumps, great care must be taken in all assembly operations. Fasteners, for instance, must be torqued precisely to keep all components in perfect alignment.

Because of the critical importance of fasteners to its products, Gilbarco has selected Stanscrew heat-treated cap screws for such key applications as the positive displacement meter (shown in the insert). Stanscrew fastener specialists were happy to assist Gilbarco engineers in determining the right fastener with the correct torque to assure trouble-free service.

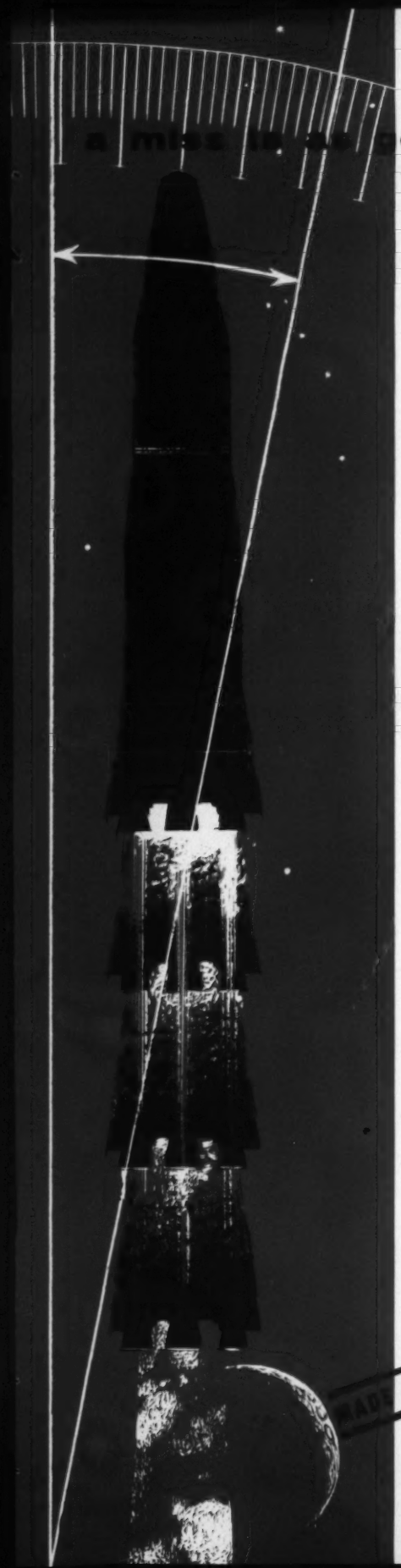
Gilbert & Barker is one of a long roster of honored names in American industry who have found it pays to standardize on Stanscrew. A product of unsurpassed quality . . . a broad selection of more than 5,500 different fasteners . . . prompt service through local distributors, backed by complete stocks at three conveniently located plants . . . these are a few of the reasons Stanscrew means greater value in fasteners.

Stanscrew's experienced fastener specialists can often suggest ways to improve your assembly procedures. Your local Stanscrew distributor will be happy to arrange a prompt visit. Call him today.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois



a miss is as good as a thousand miles

the higher you aim
for new **productivity**
the more you need
Scovill's "count down"
on quality

SCOVILL®

brass
copper
aluminum

MILL PRODUCTS

MADE IN USA

. . . and made better to bring out the BEST in your products

SCOVILL MANUFACTURING COMPANY
Mill Products Division, 99 Mill St., Waterbury 20, Conn., Phone Plaza 4-1171

6SC60

SCOVILL

gives you fault-free metals ® for **high speed** fabrication

Advanced mill processes — Scovill pioneered the CONTINUOUS CASTING of Brass alloys to bring fabricators of Brass Mill Products the new standard of metal soundness and uniformity made possible by this unique process.

Other more recent new mill installations at Scovill include precision-controlled Aluminum rolling mills; the advanced Sendzimir Mill for extra-close-tolerance sheet and strip; the World's largest vertical tube extrusion press, with automatic induction billet-heating equipment, as well as one of the Industry's newest and largest specialized tube mills.

Advanced quality-control procedures — insure dependable UNIFORMITY in all Scovill Mill Products specifications . . . order to order and lot to lot. They promise more accurately dimensioned, finer quality mill products essential to efficient high speed fabrication. Quality-control is a full-time job at Scovill, and the results are evident to fabricators in their own higher production speeds, minimum tool and machine adjustments and superior quality of finished products.

Advanced inspection equipment and methods — There are many inspection stations along each of the Scovill production lines for Brass strip and sheet, rod, wire and tube. In addition, samples of alloy billets and bars, as well as of finished mill products, undergo detailed inspection and test procedures in Scovill's Metals Research laboratories. Brass Mill Products that pass these rigid inspections and tests are considered by many to be the finest in the World.

Advanced packaging — Unique Scovill packaging methods protect quality, finish and condition, make it easier for fabricators to warehouse, handle and use Mill Products. Time- and cost-saving innovations such as extra-long-length coils of strip, self-feeding wire "dispenser" drums, special long lengths when required in tube mill products, are available to fabricators who need them.

Make Scovill a part of your competitive team, let us contribute our wealth of experience and ultra-modern equipment to the success of your NEW products and production plans.

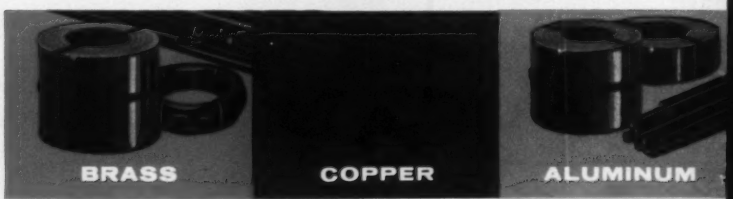
SCOVILL MANUFACTURING COMPANY

Mill Products Division, 99 Mill Street, Waterbury 20, Conn. Phone PLaza 4-1171

MADE IN USA

. . . and made better to bring out the ***BEST*** *in your products*

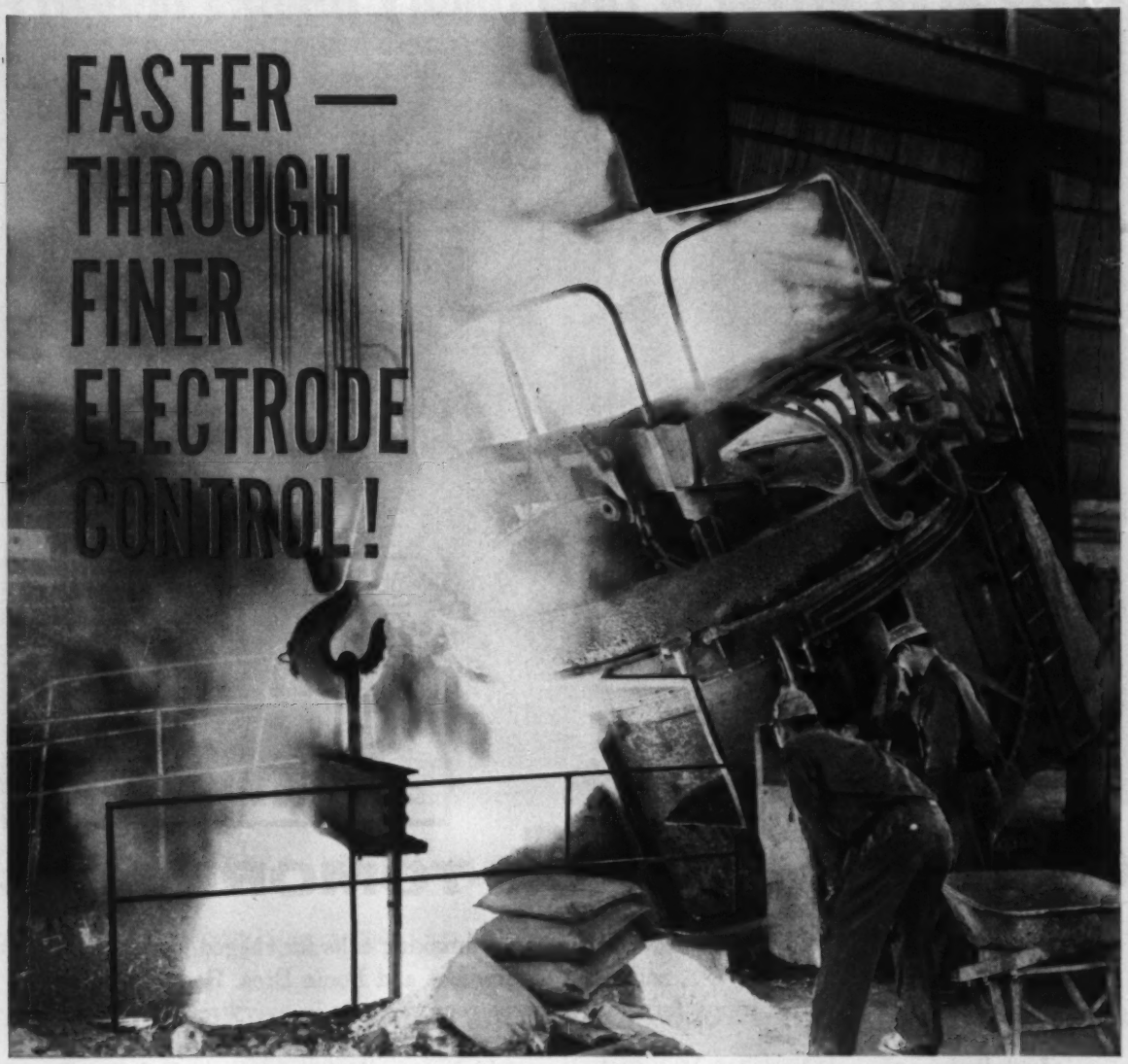
7SC60



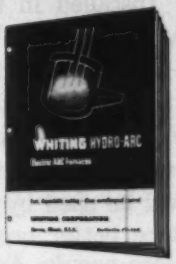
MILL PRODUCTS

FLORIDA STEEL CORP., TAMPA, SELECTS HYDRO-ARC ELECTRIC FURNACE FOR FLORIDA'S FIRST STEEL MILL!

FASTER — THROUGH FINER ELECTRODE CONTROL!



Hydro-Arc electric furnaces, from Whiting, give you full-time arc efficiency, faster heats, more wattage turned into melt, lower electrode consumption, virtually no electrode breakage. Arc adjustment is instantaneous. Mechanical lag? Almost totally eliminated by non-stop, non-reversing electrode motors plus vital air counter-balance. Here's Whiting's new concept in low-cost electric melting—new, yet fully proven for your benefit in steel mill after steel mill. Look into Hydro-Arc now!



Get Details in Hydro-Arc Catalog No. FY-168, or ask a Whiting furnace engineer to call. No obligation. *Whiting Corporation, 15643 Lathrop Avenue, Harvey, Illinois.*

See Our Catalog in SWEET'S

FEMA

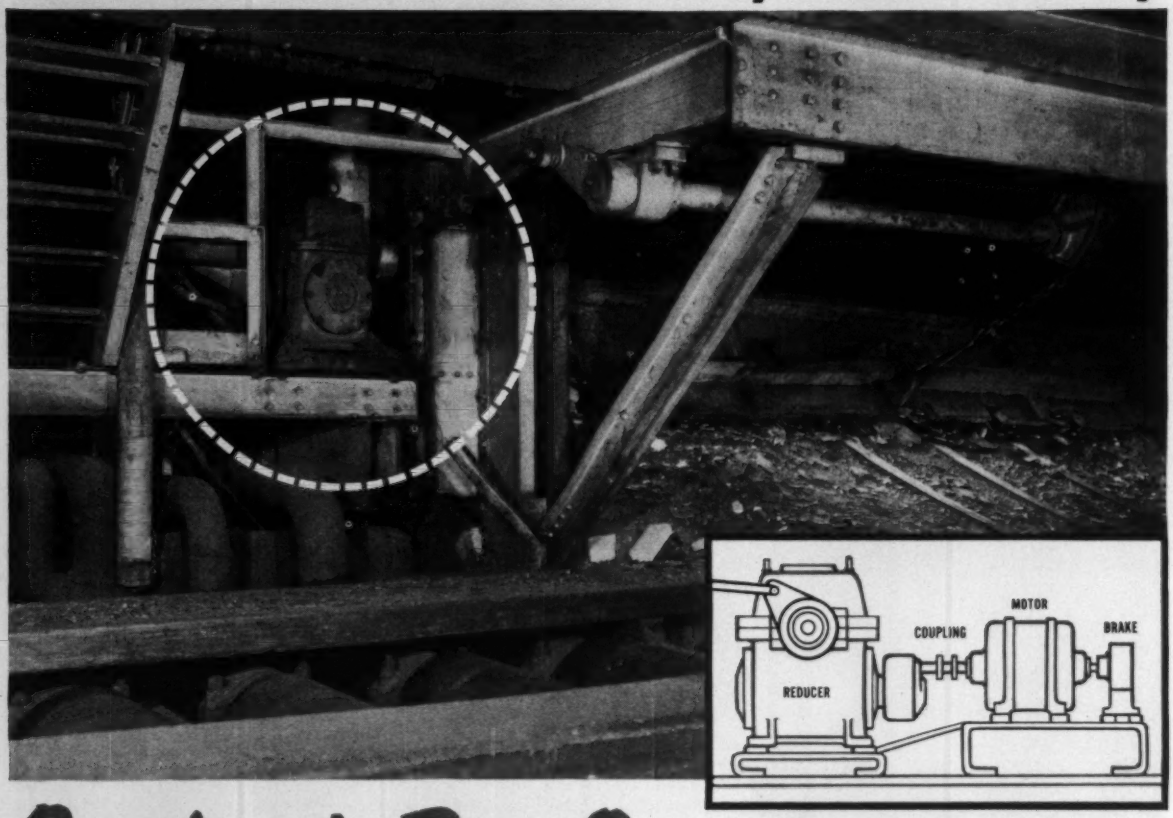
87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

ELECTRIC FURNACES

WHITING

MANUFACTURERS OF CRANES; TRAMBEAM® HANDLING SYSTEMS; PRESSUREGRIP; TRACKMOBILES®; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL EQUIPMENT

Foote Bros. Drives In The Primary Metals Industry



Opening the Door On TOMORROW

Every time this Foote Bros. Worm Gear Reducer operates, "tomorrow" . . . and the promise it brings of better living for more people, comes a little closer.

Installed in the modern 44" Hot Strip Mill at Inland Steel Company's Indiana Harbor plant, this Reducer opens one of two discharge doors on the No. 4 Reheat Furnace to begin the process of converting red hot slabs into coils of sheet steel which will be used by Inland's customers to produce better products for better living for more people. Another Foote Bros. drive is used to open the other door.

Steelmaking calls for rugged, dependable equipment and Foote Bros. Reducers meet these requirements in every respect. Precision generated gearing, heavy duty shafts and high capacity bearings are all designed to provide the kind of trouble-free service required in today's high speed steelmaking operations. Maintenance men have no trouble with the many Foote Bros. Drives at work in the Inland plant because these drives are built for "no downtime" service.

There's a Foote Bros. Drive for your power transmission requirements. Ask your nearby Foote Bros. Authorized Distributor for information or assistance concerning your power transmission problems. He's ready to help you.

FOOTE BROS. GEAR AND MACHINE CORPORATION

4583 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES

Call on Marathon for steel of the highest quality . . . high speed, tool, alloy, stainless and heat resistant. Available in bars, sheets, wire, castings and forgings, etc., conforming to S.A.E. and A.I.S.I. specifications, plus many other special steels to meet individual requirements. Additional information and details gladly supplied. Contact us for immediate attention to inquiries and special problems.

MARATHON

SPECIALTY STEELS, INCORPORATED

A Division of Deutsche Edelstahlwerke A. G., Krefeld, West Germany DEW 375 Park Avenue, New York 22, N. Y.

NORTHERN Cranes for production

Repeated selection of Northern Overhead Electric Traveling Cranes in high production plants is evidence of their dependability in providing long-term, low-cost, heavy duty service—fast, accurate operating control—minimum downtime for maintenance—maximum safety—and three-shift service seven days per week when required. For additional information call your nearby Northern representative, or write or call Northern's main office.

These four Northern Cranes, each of 25-ton capacity (with 10-ton auxiliary hooks) and 116-foot span, are operating in a large, integrated automotive press plant. Each crane has 8-wheel compensating end trucks, full length footwalks on both girders, and rotating steel handling equipment.

MATERIAL HANDLING EQUIPMENT BY NORTHERN

NORTHERN ENGINEERING WORKS
210 CHENE ST., DETROIT 7, MICH.

SE-2035

Sales representatives in all principal cities.

look overhead . . . see "NORTHERN"

Mack-Hemp rolls are right for every mill

IN BLOOMING MILLS...

For resistance to side wear: Mack-Hemp *Superalloy* nickel-chrome-moly steel blooming mill rolls produce the tonnage in mills where side wear in the passes has been severe. Sets of *Superalloy* rolls have gone 900,000 tons and more to worn-out diameter!

Where firecracking is a serious problem: Mack-Hemp *Technalloy** chrome-moly steel rolls, specially heat treated, offer excellent resistance to firecracking and breakage under heavy operating conditions.

For average conditions: Heat-treated Mack-Hemp *Technisteel* carbon steel rolls provide excellent bite and good wear resistance at low initial cost.

Let us help you get exactly the right rolls for *your* blooming mills. And remember, roll service records show that *you get more tonnage from the rolls with the striped red wabblers.*

*A registered trademark—E. W. Bliss Company

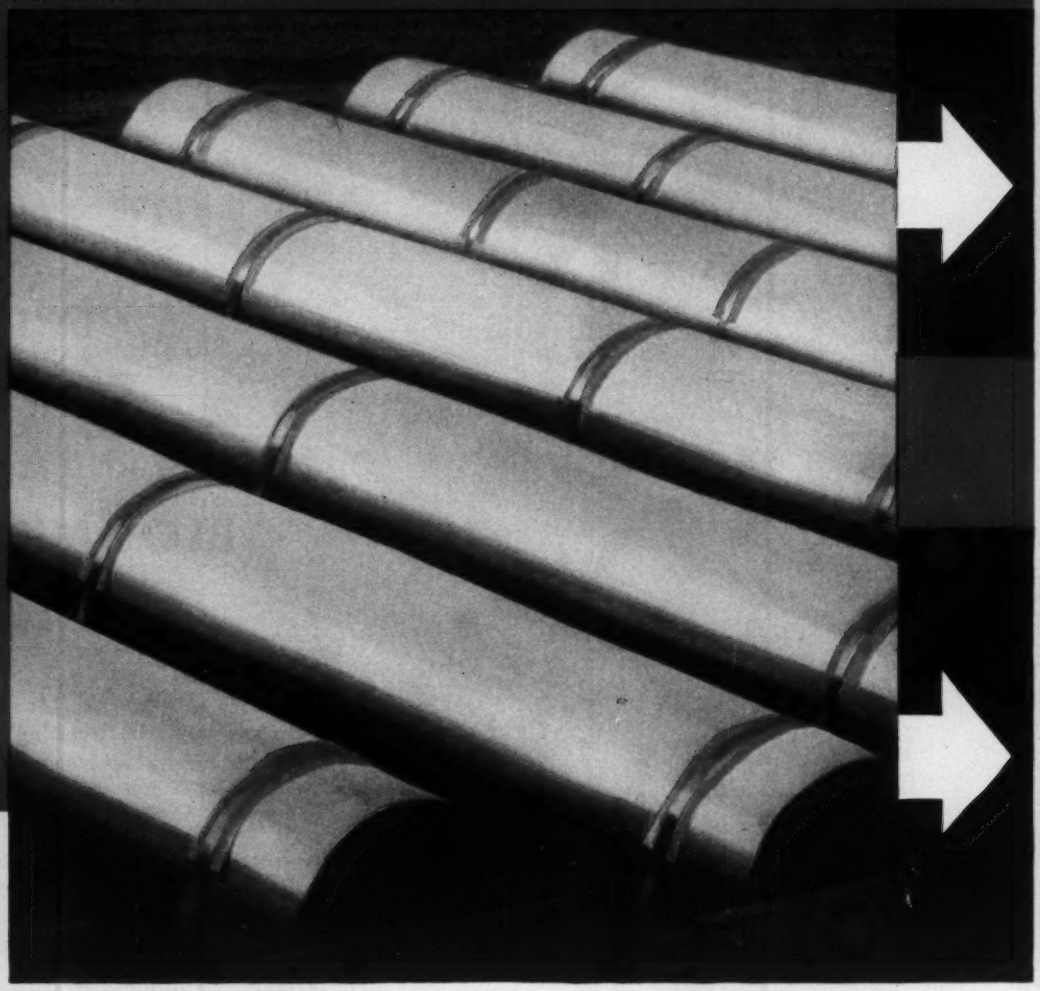
MACKINTOSH-HEMPHILL • DIVISION OF E. W. BLISS CO.

Pittsburgh and Midland, Pa.

new nuclear plants choose

FULFILLS THE EXACTING

HEAT EXCHANGERS



Centrifugal stainless steel castings readied for shipment by U.S. Pipe

The Government's new SPERT III nuclear plant at the National Reactor Station near Idaho Falls, Idaho, operating since December, 1958 to study nuclear reactor safety, uses U.S. Pipe's centrifugally cast stainless steel pipe for its coolant system.

SPERT III is classified as a high pressure, high temperature, light water moderated and cooled reactor. Its versatility permits transient tests under various initial conditions of pressure, temperature, and coolant flow. For example, pressures ranging from atmospheric to 2,500 psi and water temperatures from 68° to 668° F.

Another new nuclear power plant, engineered and constructed by Stone & Webster for Yankee Atomic Electric Company, is using centrifugally cast stainless steel heat exchanger shells made by U.S. Pipe and fabricated by the Southwestern Engineering Company in Los Angeles, Calif.

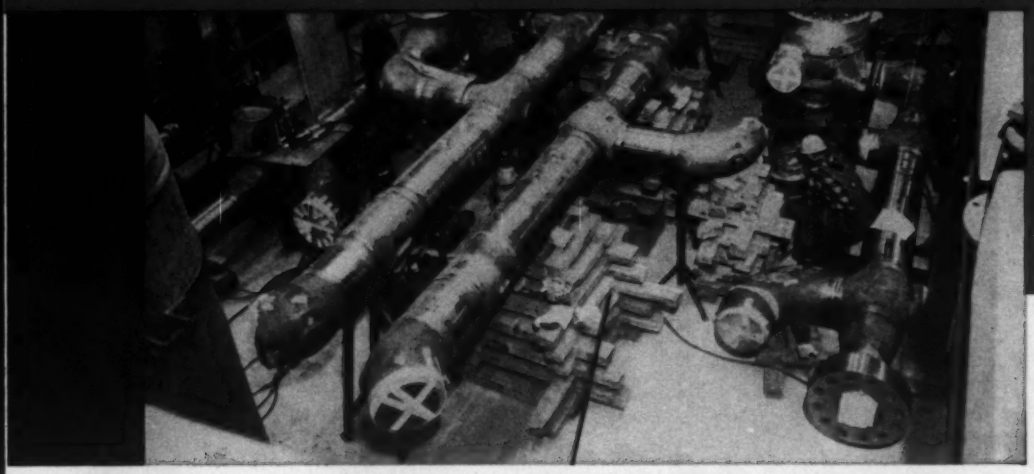
Stainless steel, centrifugally cast, made to rigid specifications, may be the answer to your piping or heat exchanger problem. For more information, write or call:

centrifugally cast stainless

REQUIREMENTS OF NUCLEAR AND COOLANT SYSTEMS

Shop-fabricated heat exchanger shells of centrifugally cast stainless steel ready for shipment to the Yankee Atomic Electric plant at Rowe, Mass.

Subassemblies of primary coolant piping of centrifugally cast stainless steel being installed in SPERT III.



ASA PRESSURE PIPING CODE STATUS

Approval has been granted under this code for the use of centrifugally cast austenitic pipe for nuclear piping by Nuclear Case N-5. This case appeared in the April, 1959 issue of Mechanical Engineering. Reprints on request.

UNITED STATES PIPE & FOUNDRY CO.

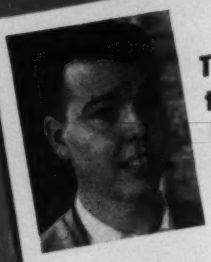
Steel and Tubes Division

STEEL & TUBES U.S. PIPE DIVISION

BURLINGTON, NEW JERSEY

SALES OFFICES: BURLINGTON, BOSTON, BIRMINGHAM, CHICAGO, CLEVELAND, DALLAS, LOS ANGELES, NEW YORK, PITTSBURGH, SAN FRANCISCO

They All Agree... You Can't Beat a Simonds High Speed Steel Metal Cutting Band Saw



Tom— the band saw operator, says:

"With Simonds saws I get straight, accurate cuts with a smooth finish."

Dick— the production manager, puts it this way:

"Since we've been using Simonds we lose lots less downtime for blade changes. Simonds blades seem to stand up better under high speeds and heavy feeds. Our cut-off production results are better."

and Harry— the purchasing agent, says:

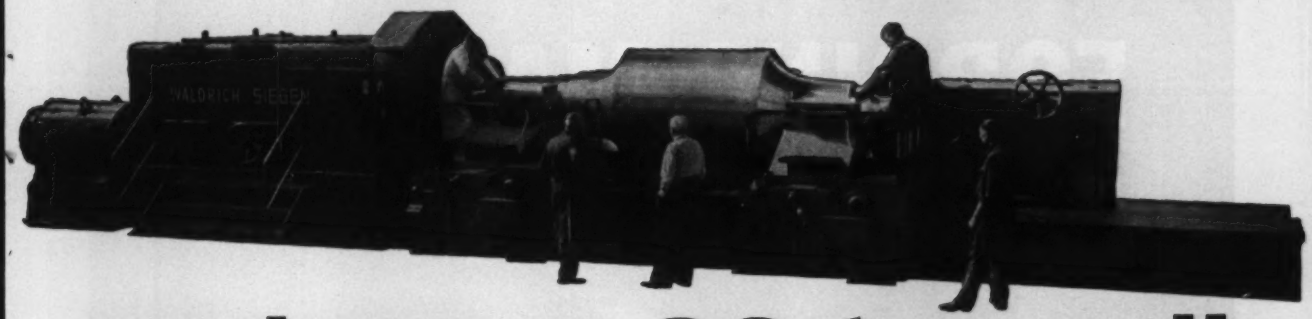
"We've been using Simonds bands for some time now. I like the easy availability from our local distributor. We don't have to wait for delivery or for service."

Why not put a Simonds High Speed Steel Metal Cutting Band to work for you and find out how much better it really is? Call your Simonds Distributor now.

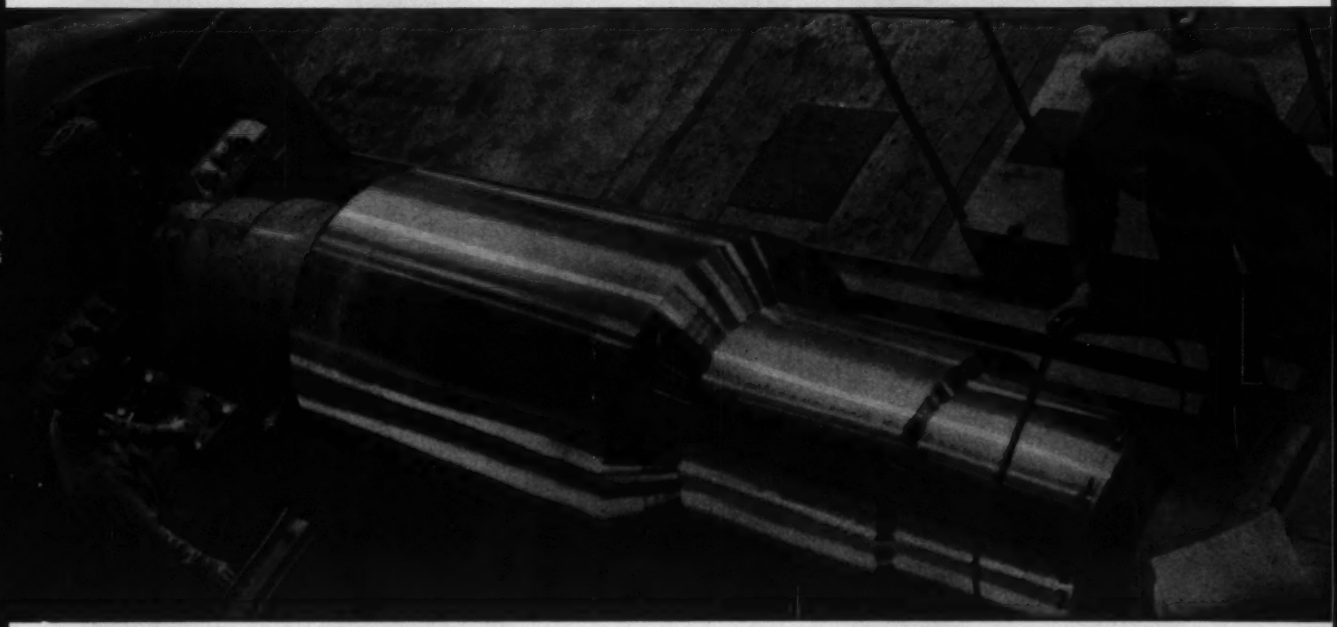
SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.
SIMONDS Industrial Supply DISTRIBUTOR

Factory Branches in Boston, Chicago, Shreveport, La., San Francisco and Portland, Oregon
Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.
Heller Tool Co., Newcomerstown, Ohio, Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

this Waldrich giant



swings a 90-ton roll



—cuts rough turning time 75%

You're looking at the business end of a Waldrich-Siegen Roll Turning Lathe, built to turn a workpiece as long as 30 ft., as fat as 63 in. in diameter, and as heavy as 90 tons!

Right now, you're seeing it in action at the Ohio Steel Foundry Co., Lima, Ohio, biting into a 57-ton, 98-in. long roll, with a 53-in. O.D. In just three passes, its hungry cutters will shear 15 inches of steel off this diameter. Before it's through, 12 tons of turnings will come off.

This job used to take 68 hours at Ohio Steel Foundry. The husky Waldrich breezes through it in just 16½ hours flat.

It takes plenty of muscle to peel through so much steel and the Waldrich has it, delivering 250 horsepower to the spindle. Speed is set at the selector wheel, feed at each of the two independent carriages.

And here's an interesting economy note: chips from the Waldrich lathe are large enough to be remelted, unlike finer chips from other lathes that oxidize too quickly. Ohio Steel Foundry collects a bonus of $15 on every ton salvaged.

Three different size Waldrich lathes are now in operation at this plant, turning workpieces with maximum O.D.'s of 36″, 48″ and 63″. Maybe one of these sizes is the answer to your roll turning needs. It's easy to find out. Write today for complete details on these heavy producers.

WALDRICH SIEGEN

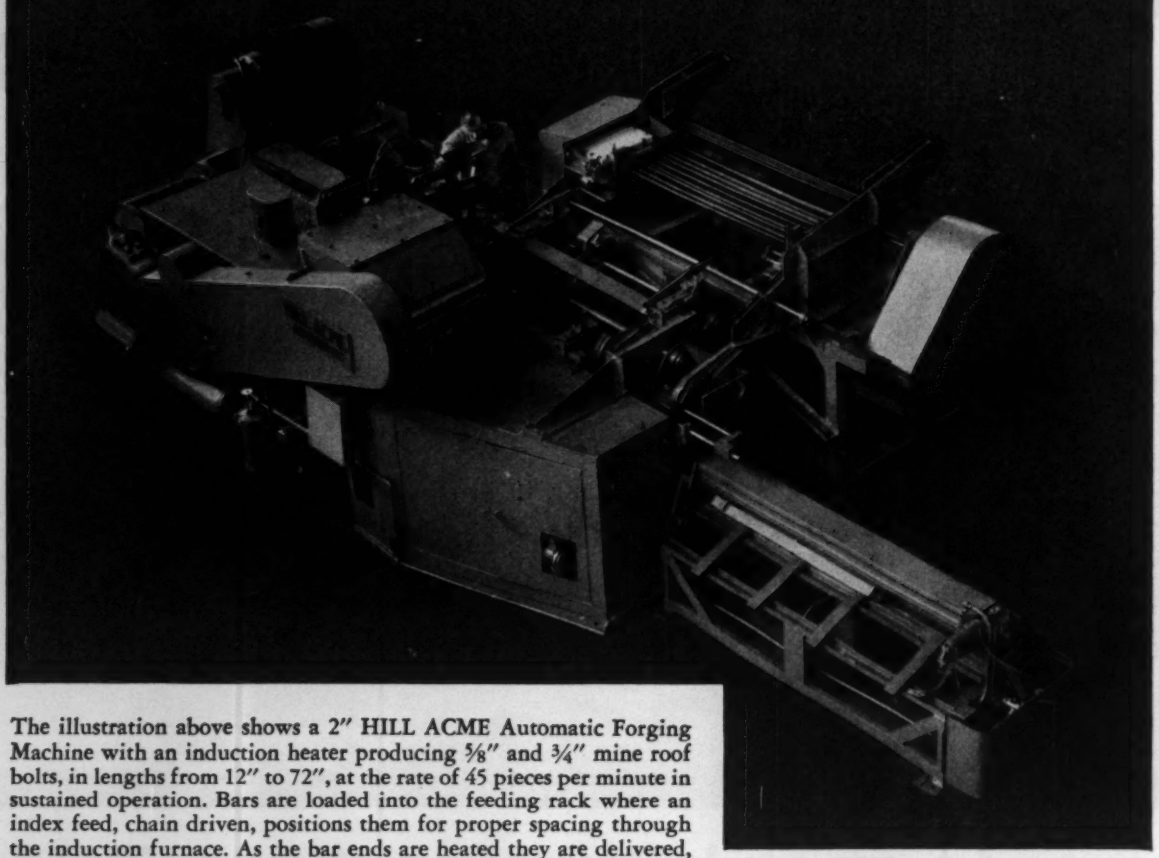
american waldrich mfg. corp.

1232 PENN AVENUE, PITTSBURGH 22, PENNSYLVANIA

Fully Automatic

FORGING MACHINE

DELIVERS 45 PIECES PER MINUTE!



The illustration above shows a 2" HILL ACME Automatic Forging Machine with an induction heater producing 5/8" and 3/4" mine roof bolts, in lengths from 12" to 72", at the rate of 45 pieces per minute in sustained operation. Bars are loaded into the feeding rack where an index feed, chain driven, positions them for proper spacing through the induction furnace. As the bar ends are heated they are delivered, at the proper timing cycle, to the forging machine by a roller chain feed where they are gauged for length, picked up by fingers and passed progressively through the dies. Finished forgings are discharged from the back of the machine by means of a separately driven conveyor, arranged for both right and left hand discharge.

The design of this new HILL ACME AUTOMATIC forging unit does not limit the number of passes or the length of stock to be used in forging a variety of parts. Pieces longer than 36" are supported by a walking beam through the various passes.

HILL ACME AUTOMATIC forging machines are built in 1¼" to 5" capacities all of which can be automated. Your inquiry concerning high speed automatic forging equipment will receive prompt attention.

MMT-PE

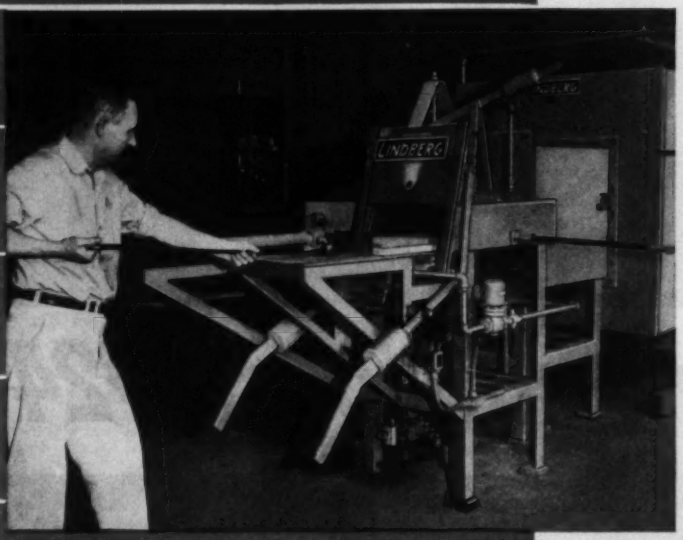
The HILL ACME Company

1207 W. 65th STREET • CLEVELAND 2, OHIO

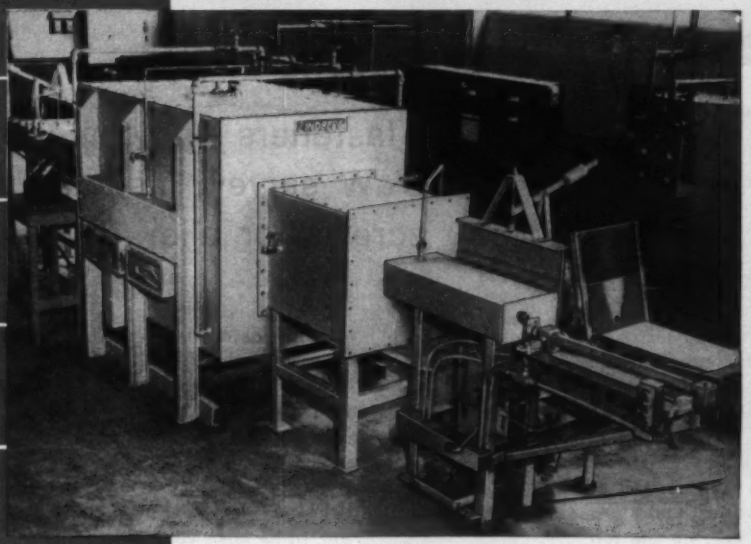
Manufacturers of: "ACME" FORGING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • ROTARY SHEARS • BAR-BILLET SHEARS • "HILL" GRINDING AND POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • "CLEVELAND" KNIVES • SHEAR BLADES • MATERIAL HANDLING EQUIPMENT

NEW LINDBERG FURNACE PROVIDES IMPROVED EFFICIENCY FOR STAINLESS STEEL SINTERING

This Molybdenum Element Atmosphere Pusher Type Furnace embodies high temperature refractories suitable for low dew point without muffle



This new furnace provides an improved method for sintering stainless steel compacts in hydrogen or dissociated ammonia. A development of Lindberg's engineering staff, you can depend on the most efficient, economical and trouble-free service from it. Furnace provides side loading and discharge parts with purging chambers. Work trays, ceramic slabs or molybdenum boats, move through the furnace by hydraulic pusher. In the installation illustrated below ammonia dissociator and control panels are shown at the right. Hydrogen supply cylinders are located outside the building. For full information on this and Lindberg's complete line of sintering and brazing furnaces just get in touch with your local Lindberg Field Representative (see classified phone book) or write us direct. Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois.



Type MOP-12307-ABC Molybdenum Element Atmosphere Pusher Furnace. Maximum Temperature 3000° F. 60 KW input. 12" wide, 30" long, 7" high. 66" cooling chamber, 38" long preheat chamber.

heat for industry

This 3¢ screw cuts costs $24

83% saving on fasteners per compressor unit revealed by RB&W survey... substituting standard cap screws for alloy screws.

This was no case of cutting corners on fastener quality. Nor was it in any way a compromise with good engineering. It was rather a reflection of the ability of the RB&W Fastener Man to look realistically at a product, and its blueprint specifications, and know what fasteners can best do the job.

His inspection showed that alloy socket head cap screws were being used for external connections which did not require such costly steel for tight joints. Nor were they installed in tight spots or recessed holes. Why then *waste* their cost? His report recommended switching to bright cap screws. Sufficient joint strength would be obtained. But instead of spending $28.88 for 147 socket screws, the unit would take $4.88 worth of cap screws . . . a saving of $24 *per unit*, and pure profit!

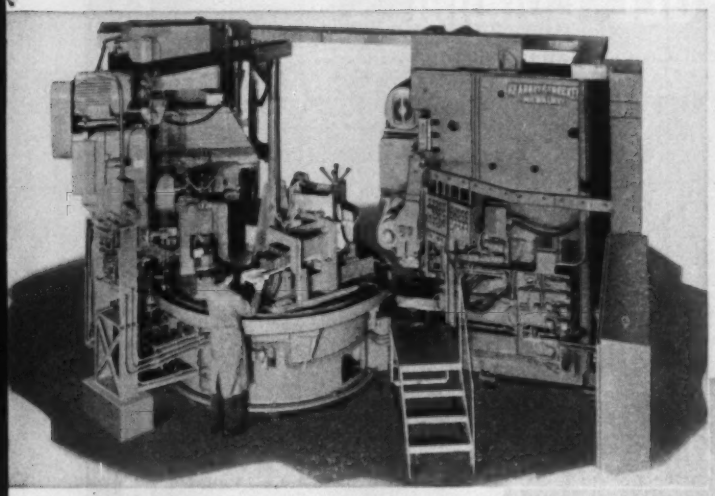
Want to be sure you're avoiding needless costs in fastener usage, and getting the *most* from your fastener dollars? Ask an RB&W man to make a survey. No obligation. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W
115th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.

MMI=PE

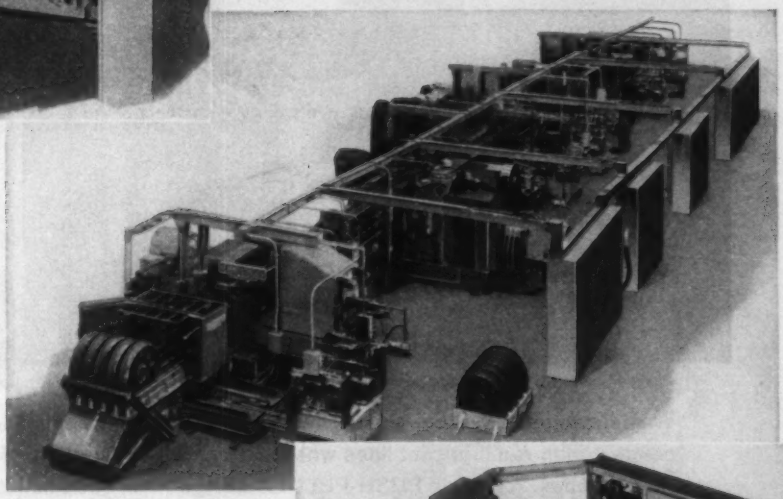
Kearney & Trecker builds production machine tools for every industry*



For Over 60 Years, Kearney & Trecker engineers have helped solve production problems of metal-working industries. Whatever your product or problem, Kearney & Trecker Custom Engineering Service can help you find cost-reducing solutions. Backing up this outstanding service is one of the most up-to-date plants in the world devoted exclusively to manufacturing modern production machine tools.

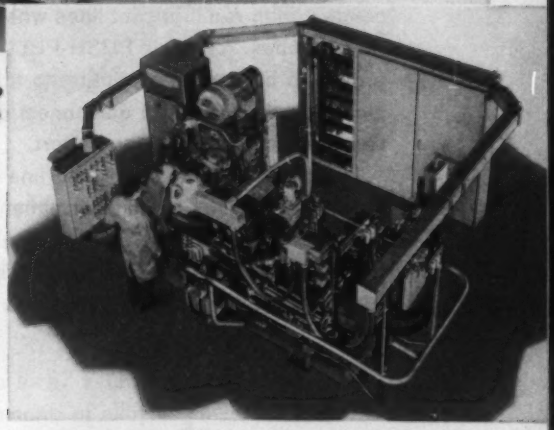
For the Whole Story

. . . ask your local Kearney & Trecker representative for Bulletin SMD-57 . . . 16 pages packed with *"Performance-Proved"* examples of how K & T Custom Engineering has paid off for manufacturers in every industry.

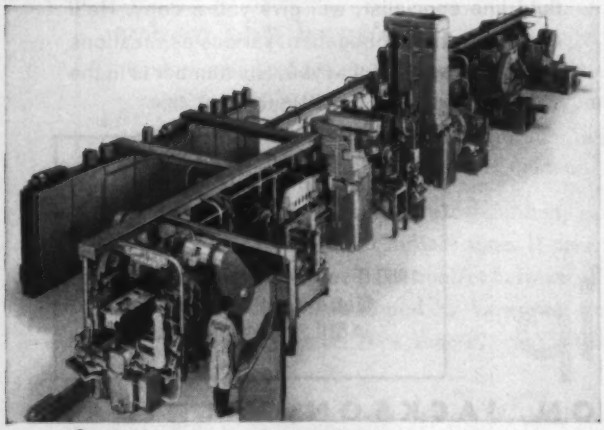


*** STEAM TURBINE INDUSTRY**
3 station rotary index machine mills root ends on large turbine buckets.

RAILWAY EQUIPMENT INDUSTRY *
30 station railroad car wheel boring, facing, and turning machine.



AIR CONDITIONING INDUSTRY *
Mills cylinder pads and feet on a variety of compressor housings.



*** DIESEL ENGINE INDUSTRY**
15 stations — 31 milling, drilling, reaming operations on 6, 8, 12-cylinder, V-type engine blocks.

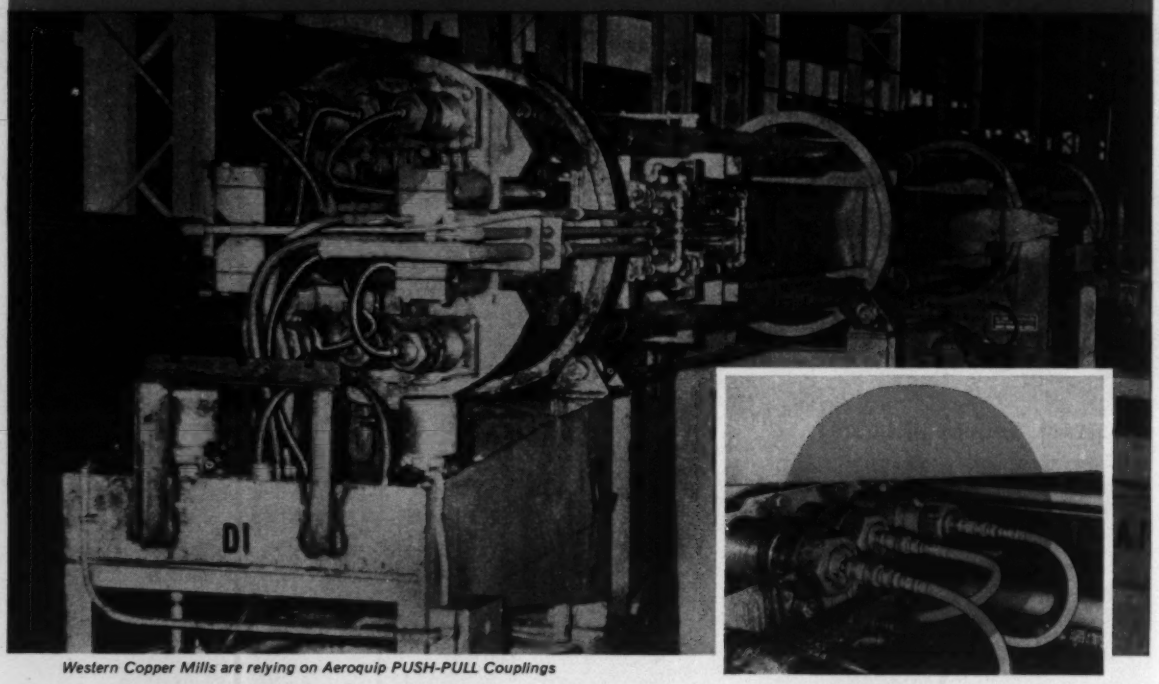
KEARNEY & TRECKER MILWAUKEE ®

Special Machinery Division

KEARNEY & TRECKER CORP.
6800 W. NATIONAL AVE. • MILWAUKEE 14, WIS.
(Phone GReenfield 6-8300... Direct Distance Dialing Code 414)

Instantly Connect and Disconnect Fluid Lines, *Without Leakage, Using*
Aeroquip PUSH-PULL Couplings

From Job Report, Western Copper Mills, Vancouver, B. C.



Western Copper Mills are relying on Aeroquip PUSH-PULL Couplings

Western Copper Mills sought a better way to disconnect plug rod lubricant lines when changing runs of tubes. Aeroquip PUSH-PULL Couplings proved to be the ideal solution to this problem since they connect and disconnect quickly and easily, saving both time and effort.

The most efficient of all fluid-line couplings, they have positive sealing when either connected or disconnected and handle working pressures to 3000 psi. The self-sealing principle allows only negligible fluid loss on disconnection.

Our files of job reports like this show you are in good hands when you consult with Aeroquip. You'll find details about the right lines of hose and reusable fitting for your particular application in Catalog 204. Your Aeroquip distributor, a fluid line specialist, will give you a copy. He'll discuss, without obligation, various applications that might be helpful to you. His number is in the "Yellow Pages" under "Hose."

VISIT AEROQUIP
in Booth 847

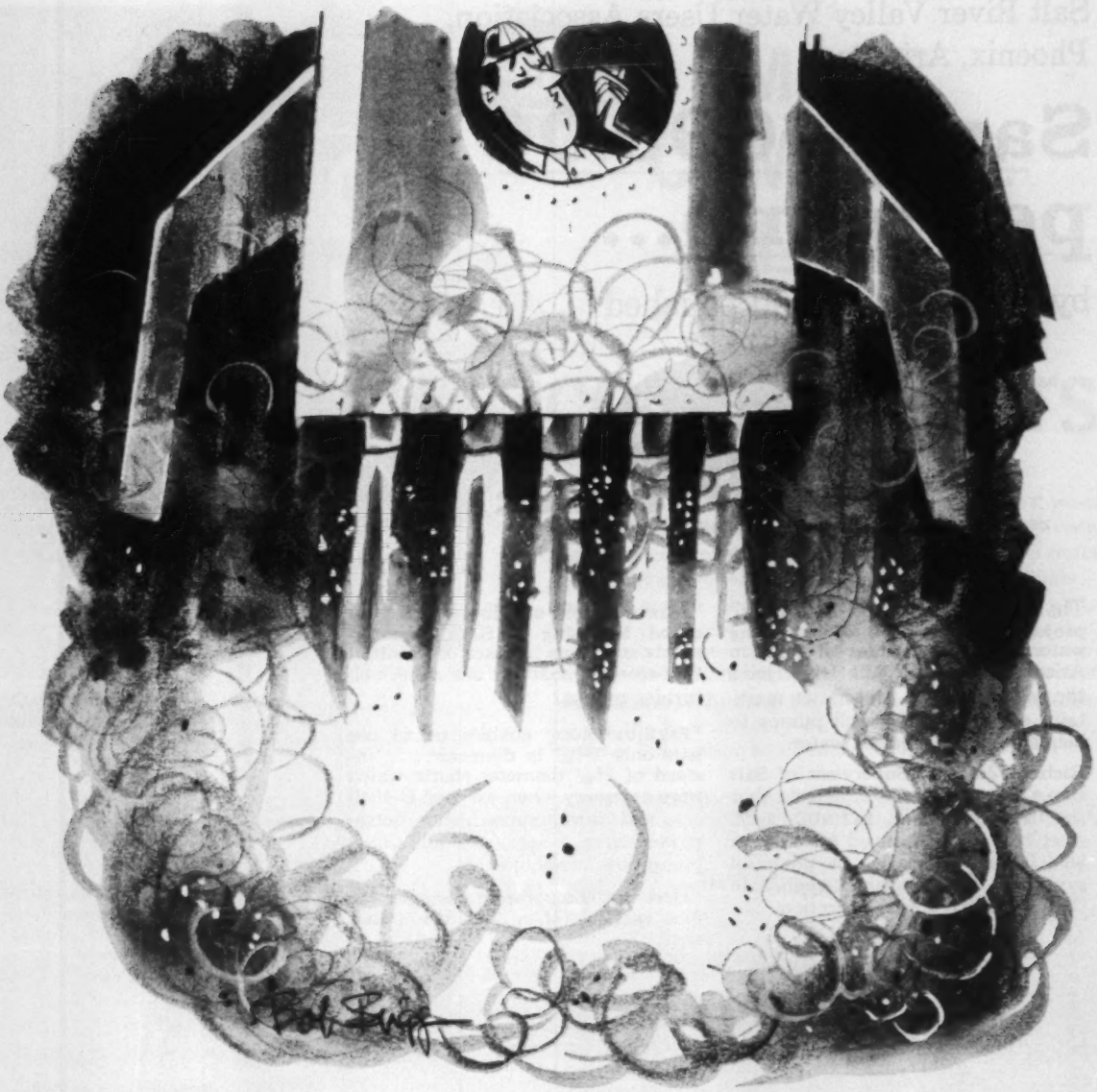
1960 Tool Show and Conference
Detroit Artillery Armory
April 21st through 28th

STANDARDIZE ON Aeroquip
REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN CANADA, U.S.A., AND ABROAD



Steel's best friend

when the heat's on... *Vancoram Columbium Alloys!* High-quality stabilized stainless and heat-resistant steels perform best with an efficient alloy like columbium. VCA's special process for production of Vancoram Ferrocolumbium keeps undesirable elements at levels well within accepted standards. VCA supplies columbium in regular ferroalloy or in exothermic form, both of which have an exceptionally high columbium content.

THERMOCOL® (Exothermic Ferrocolumbium) saves you up to $7 a ton because of high columbium recovery and reduction in furnace time. It permits large amounts of alloy to be added with minimum temperature loss, and without contact between alloy and furnace slag. Write for more information about the special advantages offered by Vancoram Columbium Alloys. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. · Chicago · Cleveland · Detroit · Pittsburgh

Be sure to visit our Booth (No. 1414) at the AFS Castings Congress, Philadelphia, May 9-13.

VANADIUM
CORPORATION OF AMERICA
Producers of alloys, metals and chemicals

Salt River Valley Water Users Association,
Phoenix, Arizona

Saves $699.00 per pump...

by using ground and polished

fatigue-proof STEEL BARS **e.t.d.**

made by elevated temperature drawing process

The men who operate the "Salt River" project have the job of supplying water to 240,000 acres of land in Arizona, where the Gila River joins the Salt River. The Association maintains some 250 deep well pumps to help supply the required water.

Richard Juetten, Supervisor of Salt River's Pump Division, reports that the use of La Salle FATIGUE-PROOF steel bars has permitted a saving of $699.00 per pump . . . a potential saving of $174,750 when applied to the 250 pumps now in operation.

Mr. Juetten's report follows:

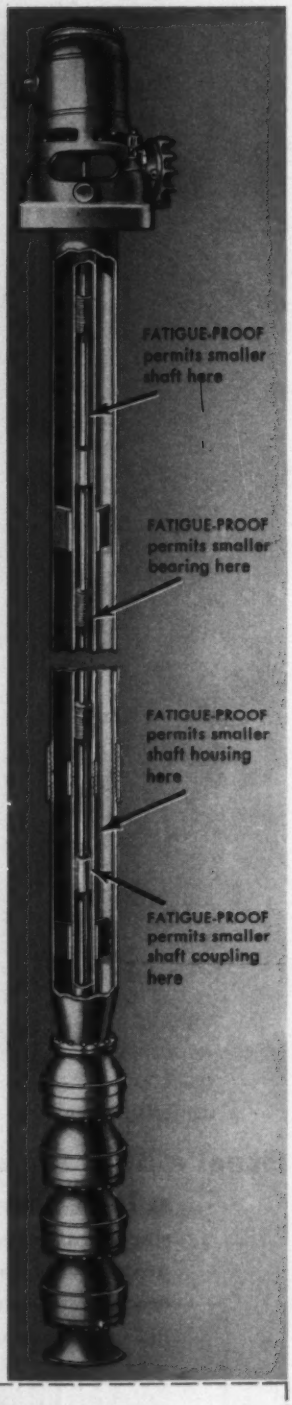
"I have figured our direct saving realized by using La Salle FATIGUE-PROOF steel bars in place of standard C-1045 steel shaft in our deep well turbine pumps.

"FATIGUE-PROOF enables us to use bars only $1\frac{11}{16}$" in diameter . . . instead of $2\frac{3}{16}$" diameter shafts which were necessary when we used C-1045 . . . and this despite higher horsepower, more weight, and additional pump bowl assemblies.

"Here are comparative costs per 10-foot section (of a 300-foot pump shaft):"

using C-1045		using FATIGUE-PROOF	
10′ x 2-3/16″ dia. shaft	$28.30	10′ x 1-11/16″ dia. FATIGUE-PROOF	$22.59
3½″ shaft housing	26.30	3″ shaft housing	19.80
2 bearings, 3½″ x 2-3/16″	21.72	2 bearings, 3″ x 1-11/16″	13.46
Shaft coupling	5.16	Shaft coupling	2.34
TOTAL cost	$81.48	TOTAL cost	$58.19
Cost per foot	$ 8.15	Cost per foot reduced to	$ 5.82

RESULT: A saving of $2.33 per foot . . . or $699.00 when applied to a 300-foot pump setting. And this doesn't take into consideration reduced power consumption.


FATIGUE-PROOF permits smaller shaft here
FATIGUE-PROOF permits smaller bearing here
FATIGUE-PROOF permits smaller shaft housing here
FATIGUE-PROOF permits smaller shaft coupling here

La Salle STEEL CO.

1414 150th Street
Hammond, Indiana

ASK FOR 24-PAGE BOOKLET—It tells the complete story of FATIGUE-PROOF®

name_____

title_____

company_____

address_____

city and zone_____ state_____

Mail to La Salle Steel Company, 1414 150th St., Hammond, Indiana

Soft Rubber Boots Prevent Injury to men or machines. A-B pendant stations are available with from 2 to 16 units, plus emergency stop unit in bottom of enclosure.

Allen-Bradley offers the

MOST COMPLETE LINE

of oiltight heavy-duty

CONTROL UNITS

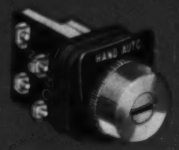
The wide selection of Allen-Bradley Bulletin 800T push buttons and control units will enable you to satisfy each and every control station requirement. A-B control units and stations have seals to exclude oils and cutting fluids—contacts cannot become fouled. And *all* control units have the popular A-B double break, silver contacts that assure reliable operation—without maintenance. The rugged construction, flexibility, and generous wiring room of Allen-Bradley's Bulletin 800T line are "bonus" features. To get the best in every way—insist on Allen-Bradley. Send for Publication 6090, today.

ILLUMINATED PUSH BUTTON
Space-saving two-in-one control unit.

4-WAY SELECTOR SWITCH
Can also be furnished for 2-way operation.

ENCAPSULATED PILOT LIGHT
Transformer type for rugged 6-volt bulb.

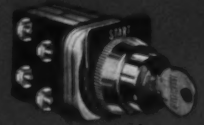
PUSH-TO-TEST
Six different color lenses available.



SELECTOR SWITCH
With coin slot operator. Other operators available.

TIME DELAY
Delay adjustable from 0.5 to 5 seconds.

POTENTIOMETER UNIT
Furnished in 2- or 5-watt capacity ratings.



LOCK TYPE
For selector switch or push button operation.

DOUBLE CIRCUIT
Has 2 N.O. or 2 N.C. sets of contacts.

16 UNIT STATION
in die-cast aluminum enclosure. Sheet metal cabinets also available for up to 25 control units.

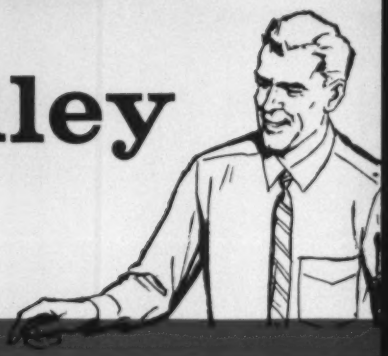
ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Yes, Allen-Bradley also makes...



A-B QUALITY

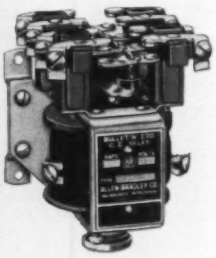
DC Contactors

Here's the only line of DC contactors using the simple solenoid design—with ONE moving part—in all ratings through Size 4. And their double break, silver alloy contacts never need servicing.

BULLETIN 202

DC Control Relays

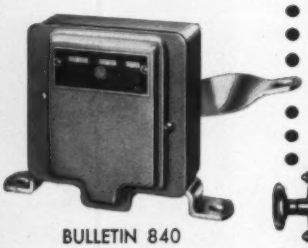
These relays are the counterpart of the Bulletin 700 line of AC relays—of which millions are in service. With only ONE moving part—these relays provide the ultimate in long life and reliability. Like the AC line, they have double break, silver contacts that never need maintenance. Made in a variety of types and with up to 8 switching poles.



BULLETIN 200

Float Switches

This versatile line of float switches is available in a wide range of types and enclosures to handle practically every industrial pumping job. They all feature a snap-action switch mechanism for positive operation no matter how slowly the liquid level changes.

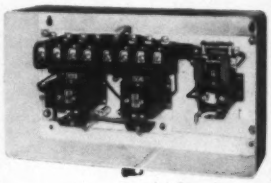


BULLETIN 840

BULLETIN 1209

Loom Switch

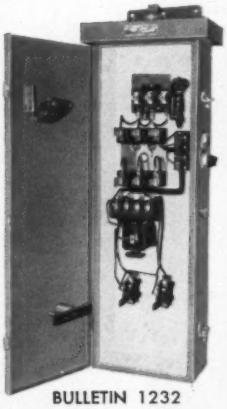
Manual starting switches designed for textile loom service. Design of operating lever makes accidental operation impossible. Lint-tight enclosure eliminates fire hazard.



BULLETIN 1270

Automatic Transfer Switches

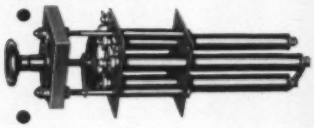
For use where power must be maintained, these panels automatically transfer the load to an auxiliary supply when normal supply fails or falls too low. Transfers automatically when the normal power supply is resumed. Mechanically interlocked.



BULLETIN 1232

Pump Control Panels

Designed for irrigation and oil field pumping applications. Can also be used with outdoor lighting systems. Uses standard A-B Bulletin 709 solenoid starter with manual disconnect switch or circuit breaker in weatherproof enclosure. Available with many optional features.



BULLETIN 410

AC and DC Rheostats

Provide absolutely stepless control over a wide resistance range. Full wattage capacity available at all settings. Sizes to 5400 watts.

6-60-RM

ALLEN-BRADLEY

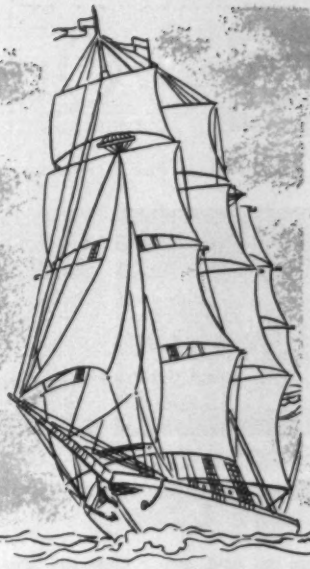
Member of NEMA

Quality **Motor Control**

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Why Rust-Oleum is different—

and what this difference, backed by 35 years of industry proof, means to you!



A Sea Captain developed it . . . Industry proved it!

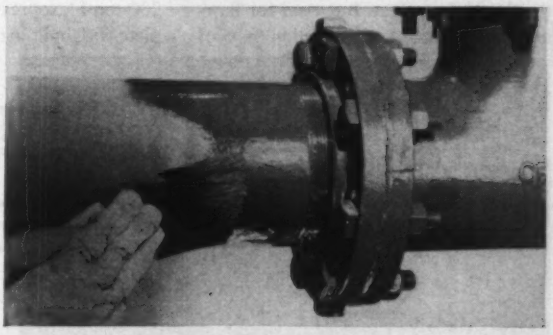
The original Rust-Oleum formula was developed nearly fifty years ago by Sea Captain Robert Fergusson, who became intrigued with the rust-stopping qualities of fish oil early in his career. Creating a *special treatment* for the fish oil, he used the *specially-processed fish oil* as the vehicle in combination with fine rust-inhibiting pigments. The result? A coating that actually *stopped rust* when applied directly over sound rusted surfaces, after scraping and wirebrushing to remove rust scale and loose rust. Possible, because the *specially-processed* fish oil penetrated the rust to bare metal. This was the birth of Rust-Oleum's *exclusive* 769 Damp-Proof Red Primer.

PROVED THROUGHOUT INDUSTRY FOR OVER 35 YEARS

Today, Rust-Oleum in its many systems and colors, has been proved throughout industry for over thirty-five years. This proof by leading industrial users is your assurance of savings in time, money, and metal. Economies made possible by the fact that Rust-Oleum 769 Damp-Proof Red Primer goes right over the sound rusted metal—usually eliminating costly surface preparations. And Rust-Oleum, in its various systems, resists rain, sun, fumes, heat, weathering, chemicals, etc., for lasting beauty over the years.

RUST-OLEUM NEW COLOR HORIZONS SYSTEM

The Rust-Oleum New Color Horizons System introduces a new coating concept to industry. It combines four important factors: (1) the ability to stop rust, (2) smart, modern color harmony, (3) the durability to last and last, (4) ease of application that saves time, money, and metal. See how this system can bring lasting beauty to your plant, machinery, equipment, pipes, tanks, structural steel, fences, etc. Write for complete information or contact your nearby Rust-Oleum Industrial Distributor. He maintains complete stocks for prompt service.



RUST-OLEUM®

There are imitations, but only *one* Rust-Oleum. It is distinctive as your own fingerprint.

STOPS RUST!®

ATTACH TO YOUR LETTERHEAD

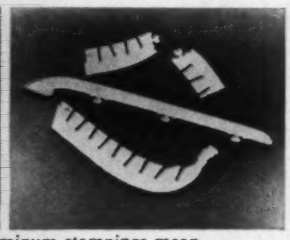
Rust-Oleum Corporation
2643 Oakton St., Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ New Color Horizons Systems Catalog featuring 110 actual color standards and 69 photo applications.
- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer to be applied over sound rusted surface.
- ☐ Results of radioactive tracing study on Rust-Oleum fish oil penetration.

PRECISION® Quarterly NUMBER 4

PRECISION WELDER AND FLEXOPRESS CORPORATION, 3520 Ibsen, Cincinnati 9, Ohio



For this magnificent automobile, these aluminum stampings mean . . .

Grille Parts TEN TIMES FASTER

DETROIT – How much would you pay for a 900 per cent boost in production efficiency? The builder of one of America's most fashionable automobiles decided it was well worth the price of a new Precision Flexopress.

The automaker had been punching out grille parts on standard sheet-fed presses. The fins are made of .120" aluminum. They have to interlock, egg-crate fashion, and look flawless in the finished product. But even for flawless decoration, the production rate of only 1000 fins an hour was exasperatingly slow.

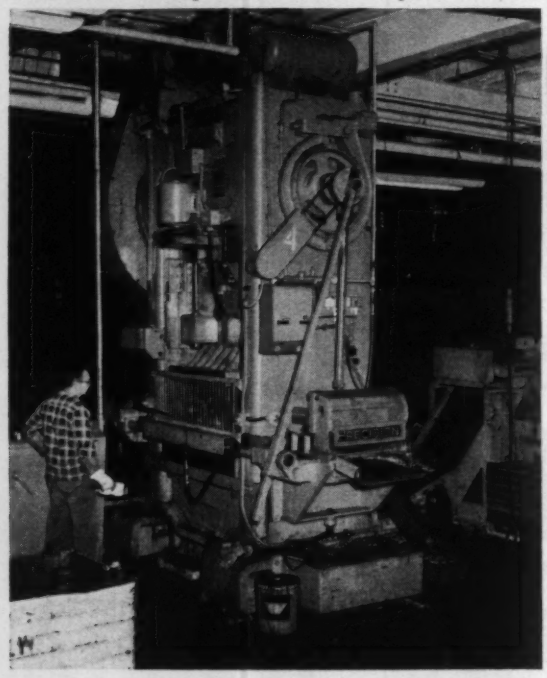
That was before the new Flexopress was installed. Now this same automaker turns out 1000 fins in seven minutes, which is a very fortunate situation because his cars are selling fast.

The Flexopress came equipped with unreeling and flattening equipment for handling up to 22" wide coils. Otherwise, it is a standard, heavy-pattern, 200-ton Flexopress with 6" stroke, complete with built-in coil feed, and designed for general purpose blanking, forming, and light drawing.

It got so far ahead on grille fin production that Planning started pulling jobs off slower presses and putting them on the Flexopress. One was an 11½" long hood retainer spring which the Flexopress proceeded to blank and punch from wide steel strip at a rate of 120 per minute, and with the die off center, too.

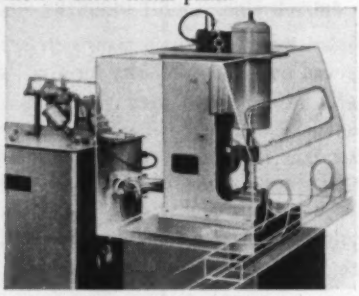
People who know presses know the reasons: The Flexopress is the only press constructed with pre-loaded, ball bearing slides. With no sliding ways to heat up, there's no thermal misalignment and no lubrication problem. The ram can't oscillate – it moves in one plane only and holds its alignment. That means longer die life and accuracy that doesn't depend on leader pins and bushings. So it's no idle boast that at 150 strokes a minute, this 200-ton press with 6" stroke can really hold its bottom-of-ram-to-bed accuracy of .0005" or less per foot of bed length.

The reputation of a press is based on the job it does – and Flexopress is winning bouquets for its work at this automotive sheet metal plant.



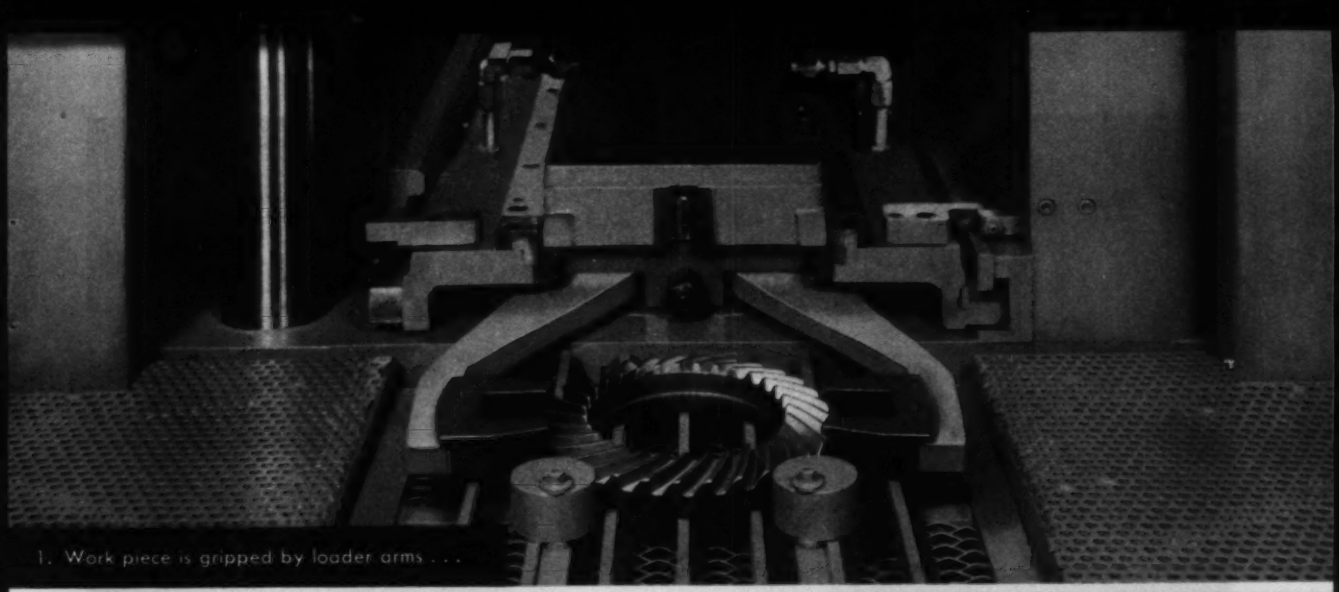
PRECISION Flexopress made a 900 per cent boost in grille production possible.

NO WELD TOO CRITICAL

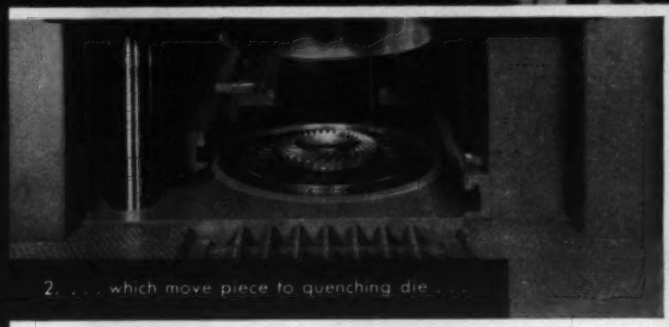


WELDED TRANSISTORS? OF COURSE! Here's a new line of Precision Magnetic Force Welding Gun machines developed for making ring welds to seal transistor "cans." Clean-cut design makes it easy to enclose these guns in dry boxes for controlled atmosphere welding. Magnetic force, which applies pressure at the critical moment of maximum heat, assures a 98 per cent or better yield of gas tight welds on transistors big as a walnut or small as a grain of rice.

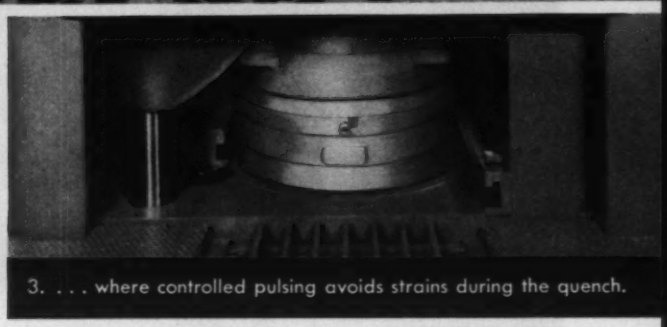
Remember, when you want to make critical welds, Precision has the experience to help you do the job right.



1. Work piece is gripped by loader arms . . .



2. . . . which move piece to quenching die . . .



3. . . . where controlled pulsing avoids strains during the quench.

New Gleason automatic quenching machine

3 times faster...superior quality achieved

The unique, fully automatic method incorporated into the new Gleason No. 117 Quenching Machine makes it possible to quench gears and other parts faster than ever before without significant distortion.

The machine discharges a piece every 30 seconds; accommodates 17 pieces in process at one time.

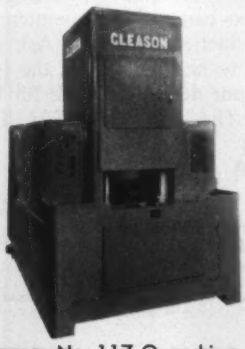
Automatic handling. Once a part is deposited at the front of the machine, the No. 117 positions it on a quenching die and then clamps, flexes, and quenches it. Initial quenching takes only about ten seconds.

When the part cools past the critical hardening temperature, it is released from the dies. Still immersed in oil, the part then cools completely as it travels on a conveyor to the unload chute. As soon as part is released from dies, the machine is ready to receive another workpiece.

Faster production. You can speed up production materially with the Gleason No. 117 Quenching Machine. It handles ring gears and cylindrical parts up to 10½" in diameter and 8" high. You can connect it with any conventional furnace so that parts are automatically fed to the quenching press. Push-button controls and timers are adjustable and easy to set. Dies can be changed quickly and easily.

Pulsing. All pressure on the work is pulsed momentarily throughout the die-quench. This permits work to contract without strain. During the die-quench, oil flows uniformly over and around the part.

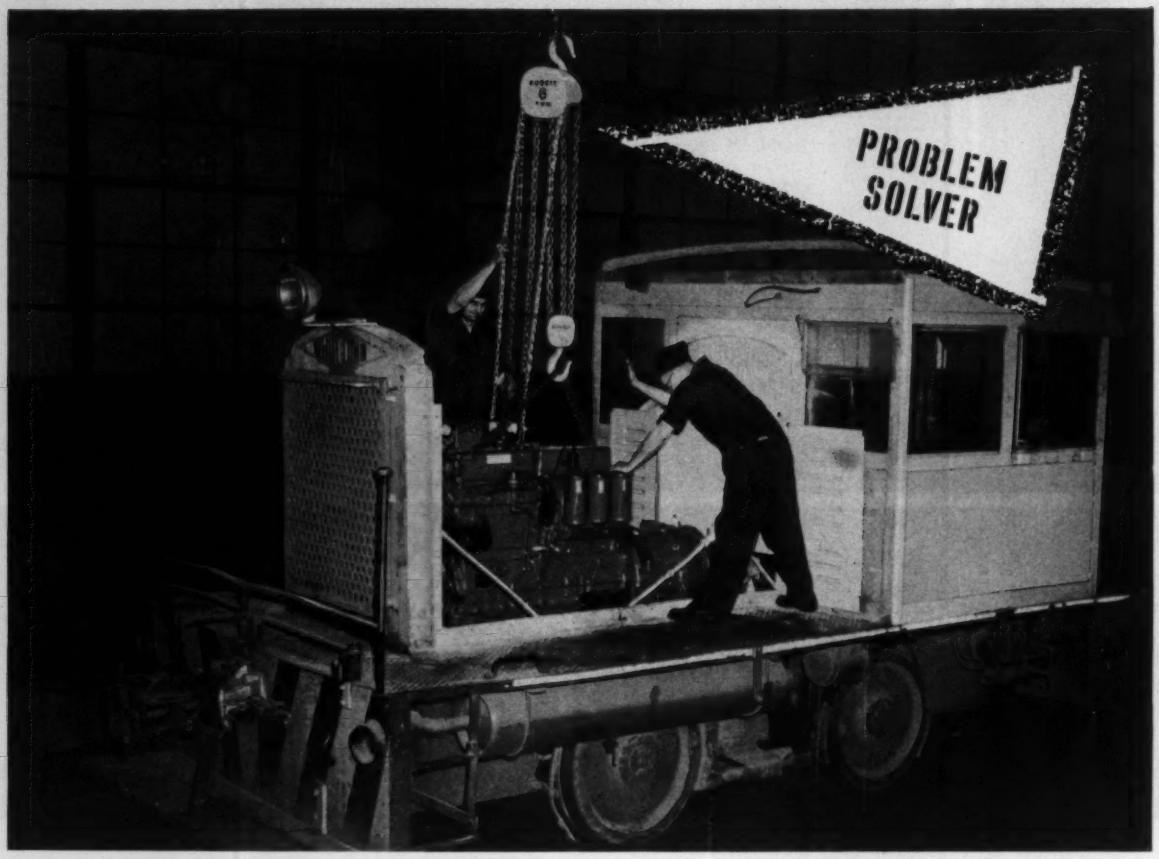
Gleason engineers are ready to help you step up productivity with this new machine. For complete details, write for bulletin.



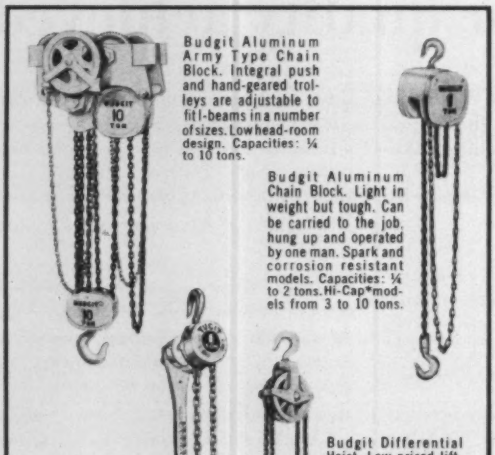
Gleason No. 117 Quenching Machine

GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.



"BACKBREAKERS" wiped out by Budgit® Chain Blocks



Budgit Aluminum Army Type Chain Block. Integral push and hand-geared trolleys are adjustable to fit I-beams in a number of sizes. Low head-room design. Capacities: ¼ to 10 tons.

Budgit Aluminum Chain Block. Light in weight but tough. Can be carried to the job, hung up and operated by one man. Spark and corrosion resistant models. Capacities: ¼ to 2 tons. Hi-Cap* models from 3 to 10 tons.

Budgit Differential Hoist. Low-priced lifting tool for occasional use where high efficiency isn't essential. Light and compact. Capacities: ¼, ½ and 1 ton.

Tugit* Lever-Operated Hoist. Light, compact, portable. Easy to operate even in close quarters at any angle. Fine for maintenance. Capacities: ¾ to 3 tons.

Eliminate tough lifting and plant maintenance ceases to be a costly muscle-aching job. A large midwestern heavy machinery manufacturer found this only too true. So now Budgit Aluminum Chain Blocks in various capacities are proving to be the perfect answer to countless lifting problems.

These lightweight hoists are easy to get to the job — easy to rig and operate at any angle. These features alone have won wide favor among the maintenance men. For instance, troublesome occasional jobs — repairing furnaces, dismantling machinery, handling large pipe, motors or valves — demand shifting as well as lifting.

Budgit Chain Blocks are also solving handling problems at numerous metalworking machines. Here the number of lifts per day are few but accurate "spotting" of heavy loads is now being done without backbreaking hand chain pull.

Backsaving Budgit Chain Blocks can cut your maintenance costs and also boost your production efficiency. Ask your nearby Shaw-Box Distributors to help you select the types and capacities best suited to your needs. Or write for Bulletin 15025-1C.

*REGISTERED TRADENAMES 60 C-1

MANNING MAXWELL & MOORE TRADE MARK

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A product of
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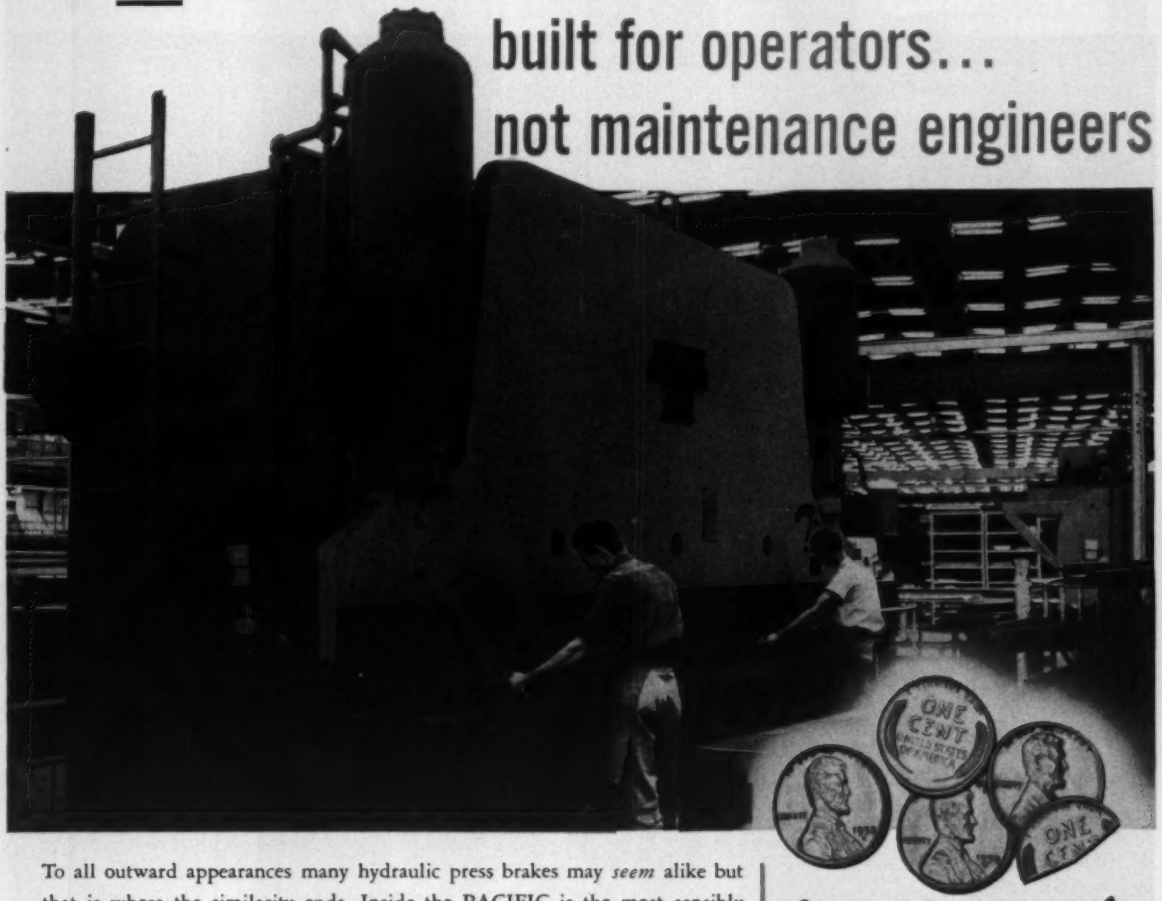
The one hydraulic press brake built for operators... not maintenance engineers



To all outward appearances many hydraulic press brakes may *seem* alike but that is where the similarity ends. Inside the PACIFIC is the most sensibly simple, patented level control system ever devised . . . only 6 microswitches and 2 relays provide the precise PACIFIC accuracy that no other hydraulic press brake can even remotely approach. Free of lineal variable differential transmitters, electronic amplifiers, photo-electric relays, amplidyne generators, complex hydraulic servo-valves, variable volume pumps and other complicated gadgets, PACIFIC hydraulic press brake can be kept in continuous operation by the ordinary plant maintenance man without the costly services of a professional hydraulic or electronic engineer from some distant factory. PACIFIC can be maintained for pennies per operating hour . . . only a fraction of the cost of the complicated machines.

Costs only 4.4¢ per hr. to maintain . . .

EARNS $7.50 NET PER HOUR

Pacific Hydraulic Press Brake at Atlas Universal Service, Inc., San Francisco, has operated continuously 16 hours a day for 9 years and 27 days with average maintenance downtime of only 5.2 hours per year and a total maintenance expense of 4.4¢ per operating hour.

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• • •

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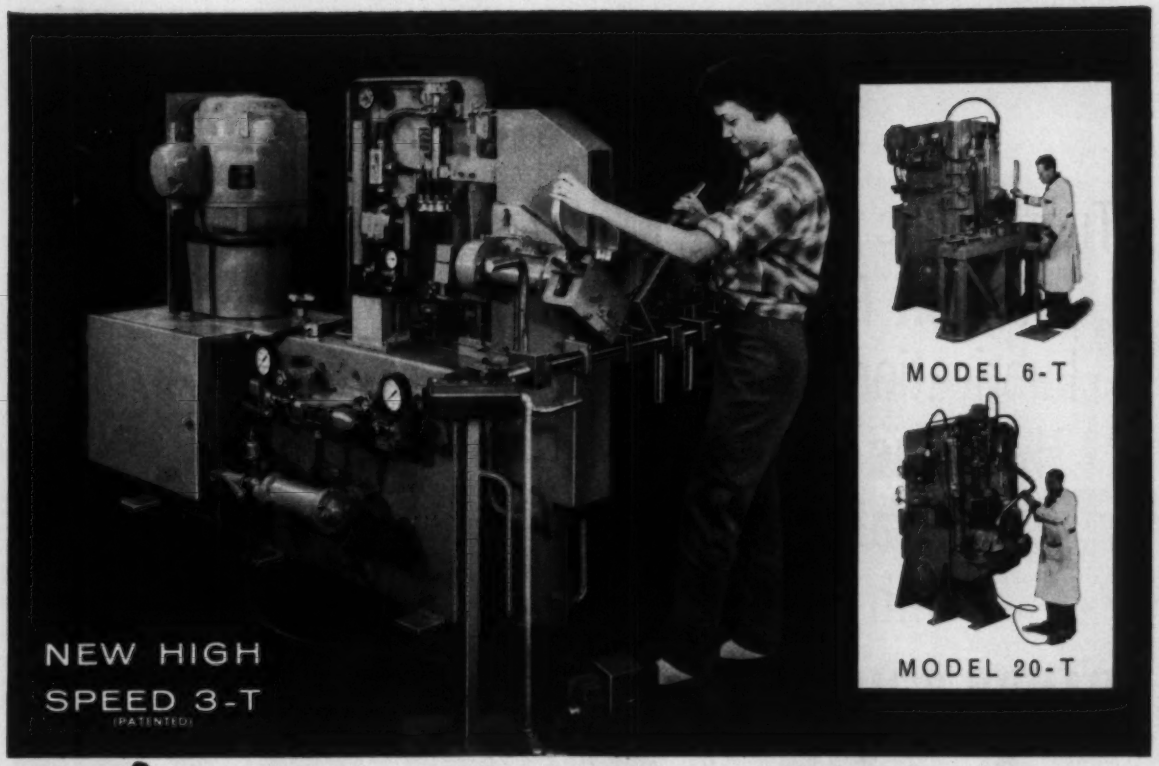

More Profitable Bending REPORTED FROM

INCREASED PRODUCTION, BROADER FLEXIBILITY, FASTER SETUP...

. . . ON NEW PINES HIGH SPEED MODEL 3-T PRESS. This new progressive bending press has proven the key to increased production, reduced costs on a variety of jobs in such industries as automotive, furniture, appliance, and farm equipment.

"INCREASED PRODUCTION" . . . reported by Bunting Co., Inc., Philadelphia. Accurate, quality bends are produced on the 3-T three times faster than by conventional methods. Speeds up to 1500 bends an hour on tubular parts up to 1" O.D.

"BROADER FLEXIBILITY" . . . says Kalamazoo Furniture Company, Kalamazoo, Michigan. Wide open tooling area permits rapid progressive bending in varied planes. Up to 10 different bend angles are automatically produced in a single setup with maintained plus or minus ½ degree accuracy.

"FASTER SETUP" . . . reported by Configured Tube Products, Bellwood, Illinois. Pick-out pins in indexing turret permit quick bend angle selection, are easily stored with stop gauges for repeat work. Quick change tooling contributes to fast, 15 minute setups.

✱ **. . . ON MODEL 6-T PRESS.** At Chromcraft Corporation, St. Louis, this multiple bending press saves time simultaneously forming "U" frames in two and three tubes per cycle at speeds up to 2000 bends an hour.

✱ **. . . ON MODEL 20-T PRESS.** At The AP Parts Corporation, Toledo, progressive bending of tubes up to 2" O.D. has increased efficiency 20% with speeds up to 800 bends an hour and near elimination of pass-along work-handling.

Get the complete profit story today. Write for New Catalog 379 on Pines Bending Presses

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HANDY & HARMAN BRAZE 541

Titeflex operator brazes assembly with torch and hand-fed Handy & Harman Alloy BRAZE 541. *Titeflex is unique in that it makes flexible hose assemblies from raw material to end product—"From End to End, Inside and Out, made RIGHT In Our Own Plant."*

This Springfield, Massachusetts, manufacturer of aircraft and missile fuel, lubrication and hydraulic lines finds that silver alloy brazing with Handy & Harman BRAZE 541 meets rigid operating requirements "all the way down the line."

The tubing and fittings of many of the wide range of assemblies made by Titeflex are 321, 316 and 347 stainless steel and Monel. Brazing is a hand torch, wire and HANDY FLUX operation.

BRAZE 541 is a plastic alloy which melts at 1325° F and flows at 1575° F. Its strength—in shear—at elevated temperatures is 21,500 psi at 500° F and 15,000 psi at 750° F. This alloy's ductility in resisting stress and vibration is very high and its resistance to oxidation and corrosion is equally impressive. The composition of BRAZE 541 is 54% silver, 40% copper, 5% zinc and 1% nickel. It meets AMS Specification 4772.

Aircraft and missile component manufacturers and fabricators are finding—to their and their products' benefit—that Handy & Harman silver alloy brazing is the full and *final* solution to their metal-joining problems. BRAZE 541 is but one of a large family of Handy & Harman alloys, for both low and high temperature applications. We would like to more fully acquaint you with BRAZE 541 and with the advantages that come naturally to silver brazing as a metal-joining (both ferrous and nonferrous) method. Handy & Harman, 82 Fulton Street, New York 38, N. Y.

FOR A GOOD START: BULLETIN 20

This informative booklet gives a good picture of silver brazing and its benefits . . . includes details on alloys, heating methods, joint design and production techniques. Write for your copy.

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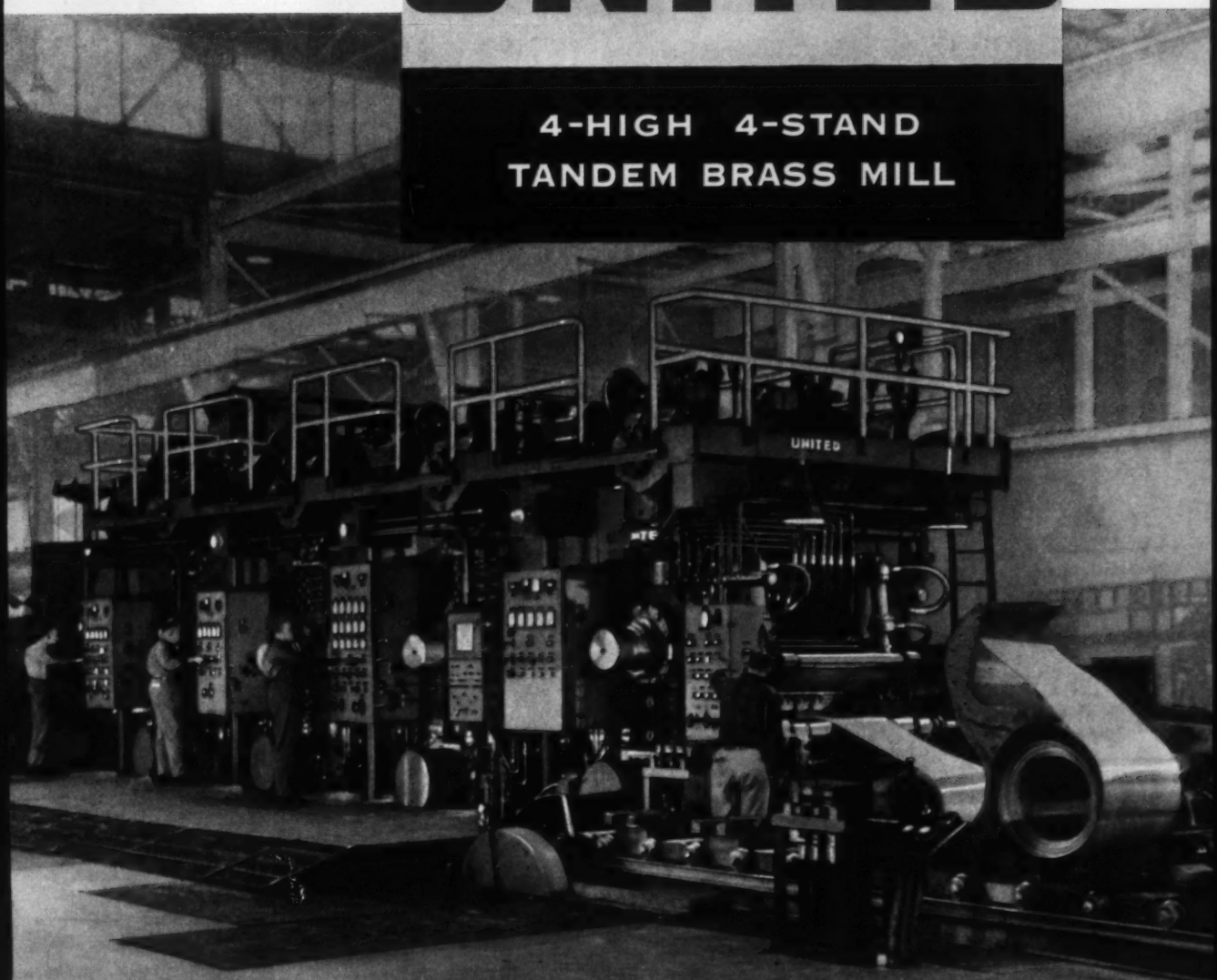

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METALOGICS AT WORK

How Ryerson helps stainless user cut costs

Production costs for a manufacturer of stainless steel fittings were high—and rising. Parts were being machined from 1-inch round, cold drawn Type 304. Its relatively slow machining speed made blanking, drilling, threading and roughing out slow and costly. Management considered that switching to 30% faster machining Type 303 would bring costs back in line. **A BETTER ANSWER:** this boost in machining rates looked like a good answer—but was it the *total* solution? With their Ryerson Representative they studied the problem further, and realized that service demanded of their fittings didn't require all the corrosion resistance of the 300 series. On the recommendation of Ryerson, they switched to Type 416 and gained *two* ways. It gave them a much higher machining rate—*100%* faster than type 304—*and* saved many dollars a ton in material costs.

There may be another stainless that will do *your* job faster, better, at lower cost. Ryerson offers *more* types, shapes, sizes, tonnage—and the knowledge of when and where to use them. Ryerson can handle your mill orders, too—saving you time and trouble at no additional cost.

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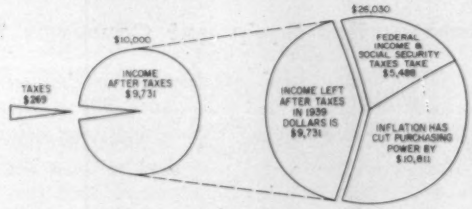
What Inflation, Taxes Do to Your Income

Today's $26,000-a-year-man has the purchasing power of a man who made $10,000 in 1939, the National Industrial Conference Board reports. Chart figures are for a married man with two children.


$26,030
$10,000
TAXES $269
INCOME AFTER TAXES $9,731
FEDERAL INCOME & SOCIAL SECURITY TAXES TAKE $5,488
INCOME LEFT AFTER TAXES IN 1939 DOLLARS IS $9,731
INFLATION HAS CUT PURCHASING POWER BY $10,811

Telemetry Advances Promise to Be Industry's Watchdog

Fix a small electronic unit to a turbine and have it report back data on the performance of the turbine blades. Attach it to aircraft landing gear to learn exactly what happens when a big craft sets down. Hook it up in a rolling mill to detect flaws in steel pipe and bars. Let it measure strain and vibration of high tension electric cables. Make it broadcast from critical areas of a transport plane the vibration, metal strain, and fatigue that occur while the ship is in flight. Or fix it to a patient in a hospital to report his temperature and blood pressure to a central recorder at regular intervals. All those things are potentially possible with a telemetry device developed by Electronetics Corp., Cleveland, the company says.

$5 Billion for Steel Expansion in '60

Expect $4.5 billion to $5 billion to be spent this year for expansion and modernization of the world iron and steel industry, American Iron & Steel Institute predicts. About $1.6 billion will be spent by U. S. companies. Russia will spend at least $1 billion. Japan will spend more than $500 million. Seven countries—the United Kingdom and members of the European Coal & Steel Community combined will spend nearly $600 million. Look for Africa's steelmaking capacity to increase 80 per cent in the next five years; North America's will rise 23 per cent; Europe's, 26 per cent; Russia's, 50 per cent.

Steel's Employment, Payroll Costs Climb Higher

Steel industry employment of hourly and salaried workers climbed to 642,506 in February—the highest in three years. The figure is 1573 above January's and 62,152 above the February, 1959, level, American Iron & Steel Institute reports. Total employment costs for hourly employees hit $3.822 an hour in February (vs. $3.707 a year earlier).

Pittsburgh Steel Acts to Halt Labor Irresponsibility

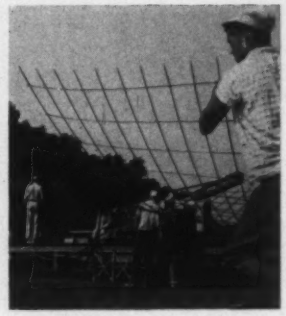
Pittsburgh Steel Co. discharged two workers and gave 38 others six-month suspensions for their roles in a wildcat strike that began Mar. 28 at the Allen-

Trends in Metals—Page 127 Market Outlook—Page 163

port Works—long a labor storm center. It cost the company more than $1 million in lost sales, cost the workers around $200,000 in lost wages. United Steelworkers Local 1187 has decided to contest the dismissals through regular grievance channels, averting what observers thought might be another wildcat strike in protest of the firings.

Construction Equipment Consumes 1.4 Million Tons of Steel

Manufacturers of construction equipment and machinery used 1.4 million tons of steel last year, American Iron & Steel Institute reports. The metal was used to turn out $1.8 billion worth of equipment. AISI predicts 1960 output will hit $2 billion. The Commerce Department estimates 1959 equipment production: 33,000 crawler tractors, 14,000 shovel-loaders, 12,000 rollers and motor graders, 5000 power cranes and shovels, 4000 large, wheel type tractors, 700 ditchers and trenchers.



Copper Sheet Price Cut

Revere Copper & Brass Inc. is trimming prices on copper sheets to meet foreign competition in the domestic market. The cuts average about 7.5 cents a pound, say industry sources. Imports of copper products shot to a record 200 million lb last year (vs. 154 million in '58).

38,124 Added to Engineering Force

U. S. colleges awarded 38,124 bachelor degrees in engineering in 1959, the Office of Education reports. Breakdown:

Aeronautical	1,363	Mechanical	8,300
Agricultural	443	Metallurgical	710
Chemical	3,010	Mining	213
Civil	4,939	Petroleum	683
Electrical	9,837	Other	1,535
General	668	From nonaccredited schools	4,429
Industrial	1,994	Total	38,124

Trade Association Encourages Foreign Competition

The Aluminum Extruders Council is fighting a Senate bill (S. 3133) that would jack up the import duty on aluminum pig from 1.25 cents to 4 cents a pound. The association claims that small fabricators need the penny a pound break they now get on the foreign metal to compete. About 242,000 tons of raw aluminum entered the U. S. last year—mostly from Norway, France, Austria, and Cameroons.

Industry Encourages Practical Politics

Look for more companies to encourage employees to participate in practical politics. Last week, for example, Ford Motor Co. formed the Ford Effective

Citizenship Program—to teach the mechanics of the U. S. political system and to encourage employees to contribute money and time to the party of their choice.

Two Firms Broaden Computer Lines

In the photo: Part of Minneapolis-Honeywell Regulator Co.'s new high speed, electronic data processing system which will print 108,000 characters per minute. The central processor will handle 6000 operations per second. It marks Honeywell's entry into the medium size computer field. Radio Corp. of America unveiled two new EDP systems last Wednesday: The 301 for small plants and the 601, a large, versatile, solid state system with a high speed memory expandable to 262,000 characters.

Steam Generator to Provide Water for Snowbound Crew

A steam generator will provide water for 200 soldiers and scientists who will spend next winter in a city beneath the snow: Camp Century, Greenland. Steam under pressure will eat through 150 ft of snow to the ice below, melt it, and form a 50 ft by 400 ft reservoir in the ice to store the water. About 10,000 gallons will be needed daily. Vapor Heating Corp., Chicago, built the steam generator.

Employment to Rise in Second Quarter

Of 2500 companies queried by Manpower Inc., international temporary help firm, 32 per cent say their employment will rise in the second quarter; only 3 per cent predict a decline. Here's the industry breakdown:

	Up	Down		Up	Down
Agricultural equipment	33%	2%	Furniture & fixtures	13%	3%
Construction	56%	4%	Primary metals	23%	6%
Electrical appliances	27%	5%	Machinery	27%	0
Fabricated metals	35%	3%	Transportation equipment	21%	12%

Contractor Foresees Wheel Motors, Gas Turbines

Before long, gas turbines will be used in hauling and earthmoving equipment, L. C. Rogers, president, Bates & Rogers Construction Corp., Chicago, predicts. He says the big advantage is weight saving—for example, a 300 hp diesel unit weighs about 2700 lb; a gas turbine with similar power would weigh about 700 lb. It means an extra ton of payload. He also looks for direct current motors in each wheel of earthmoving machines, with gear reducers in the rims. When power is turned off, the units would act as generators and brake the big machines.

Construction News

Notes from the annual convention of the Associated General Contractors of America: U. S. cities must spend $600 million annually to overcome the

backlog of needed sewage treatment plants . . . Construction expenditures under the Army Corps of Engineers' civil works program will reach a record $740 million in fiscal 1961 . . . Total spending for military construction in fiscal '61 will drop to $1.4 billion—$311 million less than in fiscal '60.

Straws in the Wind

New orders for screw machine products in February rose slightly from the January level but were only 89 per cent of the year-earlier pace, reports National Screw Machine Products Association . . . February heat treating billings climbed 27 per cent above the level of the year-earlier month, Metal Treating Institute notes . . . American Zinc Institute has boosted its 1960 research budget 50 per cent above that of 1959 . . . Verson Allsteel Press Co., Chicago, has entered the leasing field with a long term plan for its presses and press brakes, underwritten by Nationwide Leasing Co. . . . The large diameter pipe mill at the Gadsden (Ala.) plant of Republic Steel Corp. resumed operations last week after a six week shutdown.

Japan Floods U. S. Electronics Market

The U. S. imported $75.6 million worth of Japanese electronic products in 1959—350 per cent of the 1958 total. Breakdown: Radios—$62.4 million, electron tubes—$2.1 million, transistors—$1.6 million, speakers—$1.2 million, sound recorders and reproducers—$1.6 million.

Wall Television Is on the Way

Transistors will replace tubes in all TV receivers within three years and "flat" or wall television will be commercially available before the end of this decade, predicts Ross Siragusa Jr., vice president, Admiral Corp. He expects 6.5 million to 7 million new TV sets to be sold in the U. S. this year.

GM's First Quarter Output Is Record

General Motors Corp. produced 1,146,312 cars and trucks in the U. S. during 1960's first three months—a record for a first quarter and the second highest quarterly production in history (1,121,946 units were made in 1955's second quarter). Output zoomed 21 per cent above that in 1959's like period.

Metalworking Pulse

Steel: Capacity engaged in producing ingots and castings has dropped about 15 per cent since early January. **The Business Trend:** Steel and auto production cutbacks accounted almost entirely for the 4 point drop in STEEL's industrial production index. The decline obscures crosscurrents in the economy which indicate continued high level activity. **Autos:** Strikes and schedule adjustments have pulled assemblies down to year-ago figures. Good sales in March could shove them back up.

• INDUSTRIAL PRODUCTION

Week ended Apr. 9 . . . . . **168†**
Year ago **168**
Details on Page 101

• PASSENGER CAR PRODUCTION

Week ended Apr. 16 . . **135,000***
Year ago **135,934**
Details on Page 98

• INGOT PRODUCTION RATE

Week ended Apr. 17 . . **79.9%†**
Week ago **84.3%**
Details on Page 172

†Preliminary. *Estimated.

NO TRICK AT ALL • • • Can you buy tubing that will flare to 60% and still have machinability? Certainly! Special heats of steel for special applications? Certainly! If it's Michigan Seamless TAILORED TUBING made to meet the toughest specifications. A specialty mill on a production basis, Michigan Seamless has for 32 years made carbon and alloy steel tubing TAILORED to customer's needs. In many shapes and sizes. For many applications. No trick at all to meet your specifications too, *on time!* Call any of our offices—see your Yellow Pages.

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Why metals corrode...and how you can prevent it

The basic cause of corrosion is the instability of metals in their refined state. Metals tend to revert to their natural states through the processes of corrosion. For example, when you analyze rust, you will find it is iron oxide. When you analyze natural iron ore, you find it, too, is iron oxide. Six forms of corrosion which can attack the equipment you design are:

1. General tarnishing or rusting with occasional perforations in highly affected areas.

2. Highly localized attack by pitting.

3. Cracking induced by a combination of stress and corrosion.

4. Corrosion confined to crevices, under gaskets, or washers, or in sockets.

5. Corrosion of one of an alloy's constituents leaving a weak residue.

6. Corrosion near the junction of two different metals.

In all of the six forms of corrosion mentioned above, corrosion has the same basic mechanism. It's similar to the electrochemical action in a dry cell.

The electrolyte in the dry cell corresponds to the corrosive media, which may be anything from the moisture in the air to the strongest alkali or acid.

The plates of the battery correspond to the metal involved in corrosion.

A potential difference between these metals or different areas on the same metal causes electricity to flow between them through the electrolyte and a metallic bridge or contact that completes the circuit.

At the anode, a destructive alteration or eating away of metal occurs when the positively charged atoms of metal detach from the solid surface and enter the solution as ions.

The corresponding negative charges, in the form of electrons, travel through the metal, through the metallic bridge, to the cathode.

Briefly then, for corrosion to occur, there must first be a difference in potential between the metals or areas on the same piece of metal so that electricity will flow between them. Next, a release of electrons at the anode and a formation of metal ions through disintegration of metal at the anode. At the cathode, there must be a simultaneous acceptance of electrons. Action at the anode cannot go on alone, nor can action at the cathode.

CONTROLLING CORROSION

When corrosion occurs because of the differences in electrical potential of dissimilar metals, it is known as galvanic action. Differences in potential from point to point on a single metal surface causes corrosion known as local action.

When you plan against galvanic corrosion it is essential to know which metal in the couple will suffer accelerated corrosion . . . will act as the anode in the corrosion reaction.

The galvanic series table shown below can supply this information. In any couple, the metal near the top of this series will be the anode and suffer accelerated corrosion in a galvanic couple. The one nearer the bottom will be the cathode and remain free from attack or may corrode at a much slower rate.

GALVANIC SERIES TABLE

Magnesium
Magnesium alloys
•
Zinc
•
Aluminum 25
•
Cadmium
•
Aluminum 17ST
•
Steel or Iron, Cast Iron
•
Chromium-iron (active)
•
Ni-Resist
•
18-8 Stainless (active)
18-8-3 Stainless (active)
•
Lead-tin solders
Lead, Tin
•
Nickel (active)
Inconel (active)
•
Brasses, Copper, Bronzes
Copper-nickel alloys, Monel
•
Silver solder
•
Nickel (passive)
Inconel (passive)
•
Chromium-iron (passive)
18-8 Stainless (passive)
18-8-3 Stainless (passive)
•
Silver
•
Graphite, Gold, Platinum

HOW TO USE THE CHART

Notice how the metals are grouped in the galvanic series table. Any metal in one group can be safely used with any other metal in the same group. However, when you start mixing metals from different groups, you may run into serious galvanic corrosion of the metal higher on the list. And the further apart these metals are listed, the worse this corrosion may be.

But, if you have to mix metals, pay particular attention to the electrical contact between them. Eliminate any metallic bridges or contacts of metal to metal that will permit the flow of electrons through them. You can do this by separating the metals physically, or by using insulation or protective coatings. Another factor is the relative areas of the metals in contact with each other. Parts having the smaller area should be of a metal with a lower listing on the galvanic series table than the metal used for the larger area.

When you plan against local action, remember that the corrosion process is galvanic: Electrons move from one point in the metal to another. One of the easiest ways to prevent local action is to use a metal with little or no impurity. When alloys are involved, make sure the constituents are closely listed in the galvanic series table. Local action may also be stopped by the use of protective coatings, which shield the metal from the corrosive media. Environment must also be considered, for its nature may be an important factor in either promoting or restricting corrosion.

TECHNICAL ASSISTANCE

As you can see, many factors are involved in both local and galvanic action. That's why it's best to bring your metal problem to Inco's Corrosion Engineering Service. Available data will be furnished wherever possible . . . tests will be made where needed. Inco's Corrosion Engineering Service will be glad to apply principles of corrosion control to your specific problem.

LITERATURE

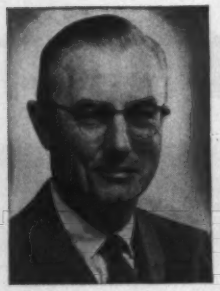
The publications listed below will provide more detailed information on how you can combat corrosion by using nickel-containing metals.

Publication Number	Name
A232 . . .	Corrosion Problems in Nuclear Reactor Power Stations
A59	Factors of Importance in the Atmospheric Corrosion Testing of Low-Alloy Steels
A62	A Theory of the Mechanism of Rusting of Low-Alloy Steel in the Atmosphere
A137 . . .	Corrosion by Some Organic Acids and Related Compounds
A144 . . .	Some Observations of the Potentials of Stainless Steels in Flowing Sea Water

A complete list of the 187 Inco publications and technical bulletins on nickel-containing metals can be obtained by writing for "List A", to:

*Registered trademark

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street INCO New York 5, N.Y.



Wake Up and Grow

When aircraft and missile makers were searching frantically for materials with greater strength at high temperatures, they first tried many new and exotic metals. But they ultimately turned to an old standby—hot work die steels—for many of the answers.

Result: A new market for tool and die steels—as construction materials. Their tailormade properties (toughness, hardness, resistance to high temperatures and to abrasion, and dimensional stability) qualify them as naturals for many new Space Age and conventional applications.

Recognizing both an opportunity and a need to expand its horizons, the tool steel industry organized a working committee to expand and improve applications and statistics.

Through co-operative and individual efforts, makers of tool steels are shaking off the lethargy that once threatened their industry. Improved production methods, including increased emphasis on vacuum metallurgy, are providing users with better materials for a variety of applications and offer an expanded market for producers. Marketing efforts are being stepped up. Research and development campaigns are giving the old standby a new life.

Tool and die steel prices are high if you compare them with those of garden variety steels. But where they can be used to advantage in structural applications, they may be the least expensive. Tool steel producers aren't selling price. They're pushing quality, service, and engineering.

A survey of 3000 metalworking executives made by the editors of this magazine in its Trends in Metals study (Pages 127-142), reveals that more people will be using tool and die steels for tool and structural applications in the years ahead.

The producers will not have to worry too much about competition from foreign makers or from more newly developed competitive materials.

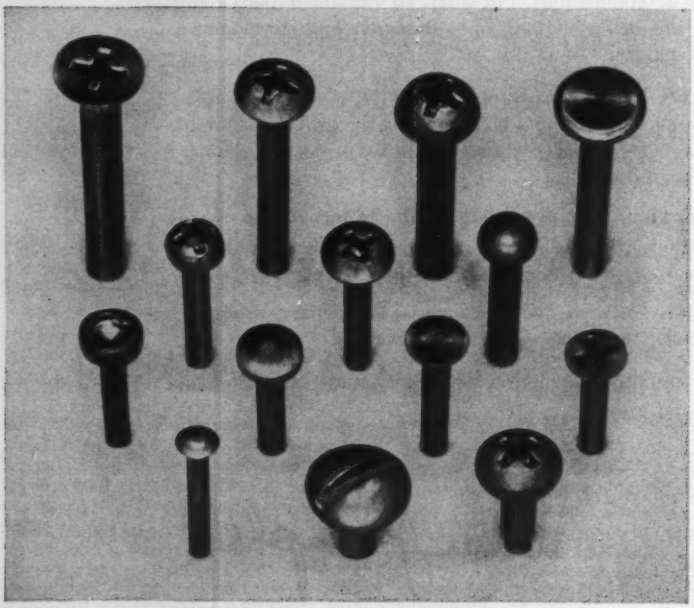
The tool steel industry is sounding the clarion for other segments of the metalworking industry to wake up and grow.

Walter J. Campbell

EDITOR

COLD-HEAD THESE AT *450* PER MINUTE

National High Speed Headers are capable of producing a wide variety of odd shapes like the above, as well as conventional fastener blanks.



Screw blanks stand perfectly erect. Such accuracy of product begins with a square, clean cutoff blank.

If you operate Headers, or use metal parts in quantity, here is good news.

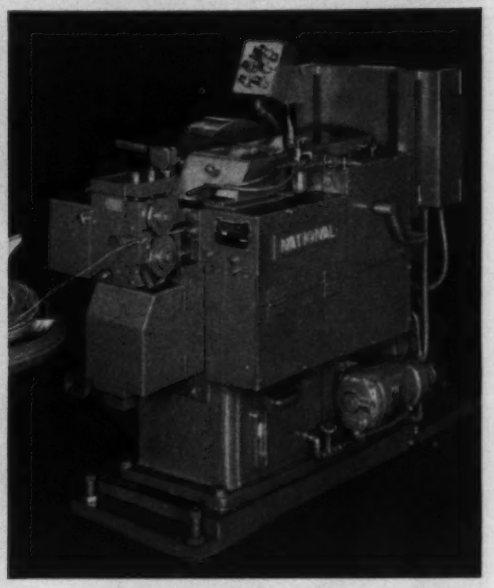
The National High Speed Cold Header is the exciting new breakthrough in producing metal parts!

Witness production runs of difficult-to-make parts. Observe the many advanced features in machines and tooling, as well as new cold-heading techniques now proved in everyday production.

Start now toward the benefits of sustained production at the highest *safe* speeds ever achieved. Be among the forward-looking header plants installing Nationals these days.

We offer you (1) A precision, hand-crafted machine, (2) Sound engineering assistance, and (3) Our experience in helping you flow metal.

ON NATIONAL 1/8" HIGH SPEED HEADERS!



1/8" High Speed Double Stroke Solid Die Cold Header: 450 accurate pieces per minute

← 3/16" High Speed Double-Stroke Solid-Die Cold Header: 350 accurate pieces per minute

Not just speed alone, but speed *plus...*

- Accuracy of Product
- Rigidity—Good Tool Life
- Holds Adjustment Well
- Lower Maintenance
- Fewer and Simple Adjustments
- Can Handle Many Jobs

We welcome you to Tiffin for actual demonstrations and a thorough study of your cold heading requirements.

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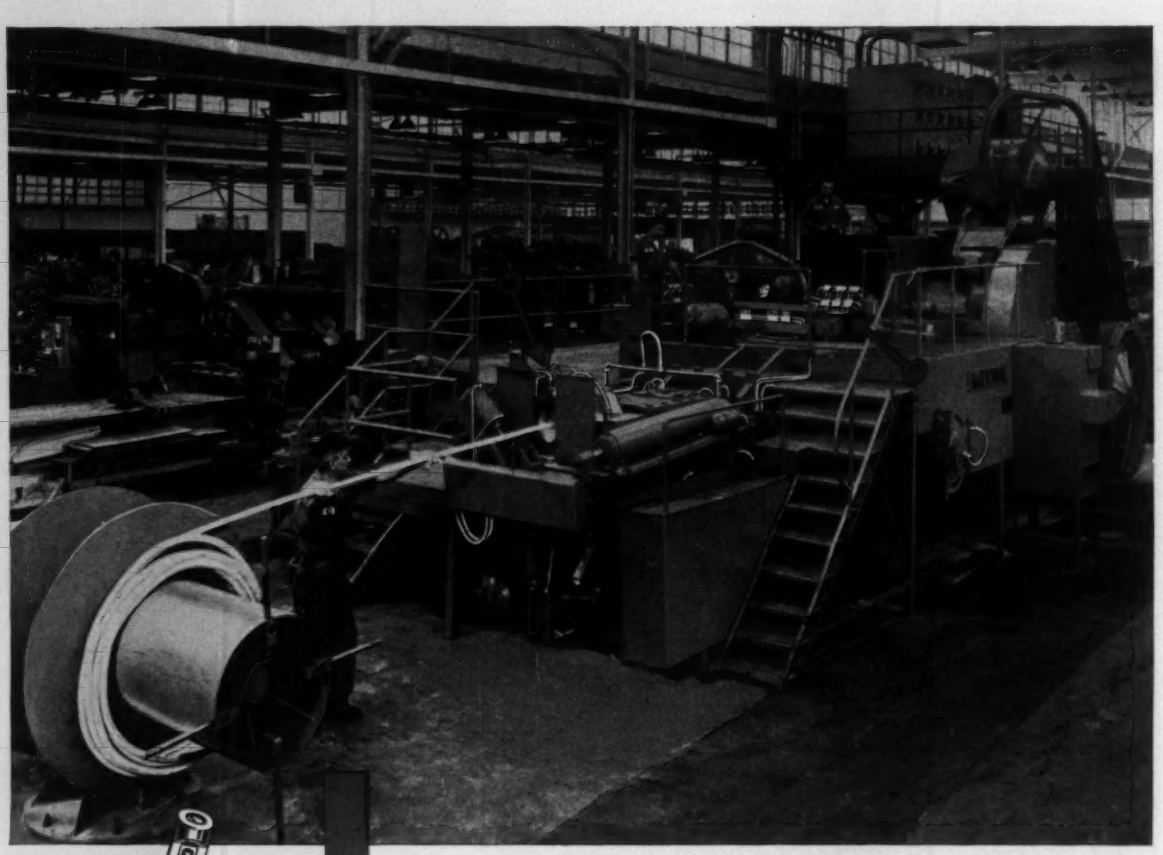


FARVAL—Studies in Centralized Lubrication No. 238

Farval automatically lubricates 138 bearings on world's largest Boltmaker

It's a 1¼-inch cold forger, designed and built by National Machinery Co. for the Cleveland Cap Screw Co., Cleveland, Ohio. This versatile machine automatically produces hex head cap screws. It draws steel rod to wire size, cuts it to proper length, extrudes the blank, heads, trims the head, points the end and then rolls on threads, all this at the rate of 38 complete screws per minute.

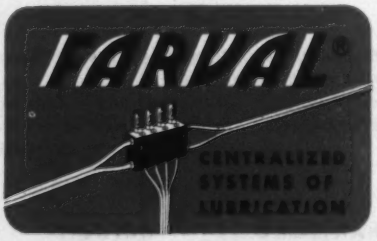
A Farval timeclock-controlled, motor-driven lubricating system guarantees against failure of the machine's 138 vital bearings, as well as supplying spray lubrication for the cold-forger's chain drive. If bearings should fail on such a high output machine—production costs skyrocket, profits take a nose-dive.

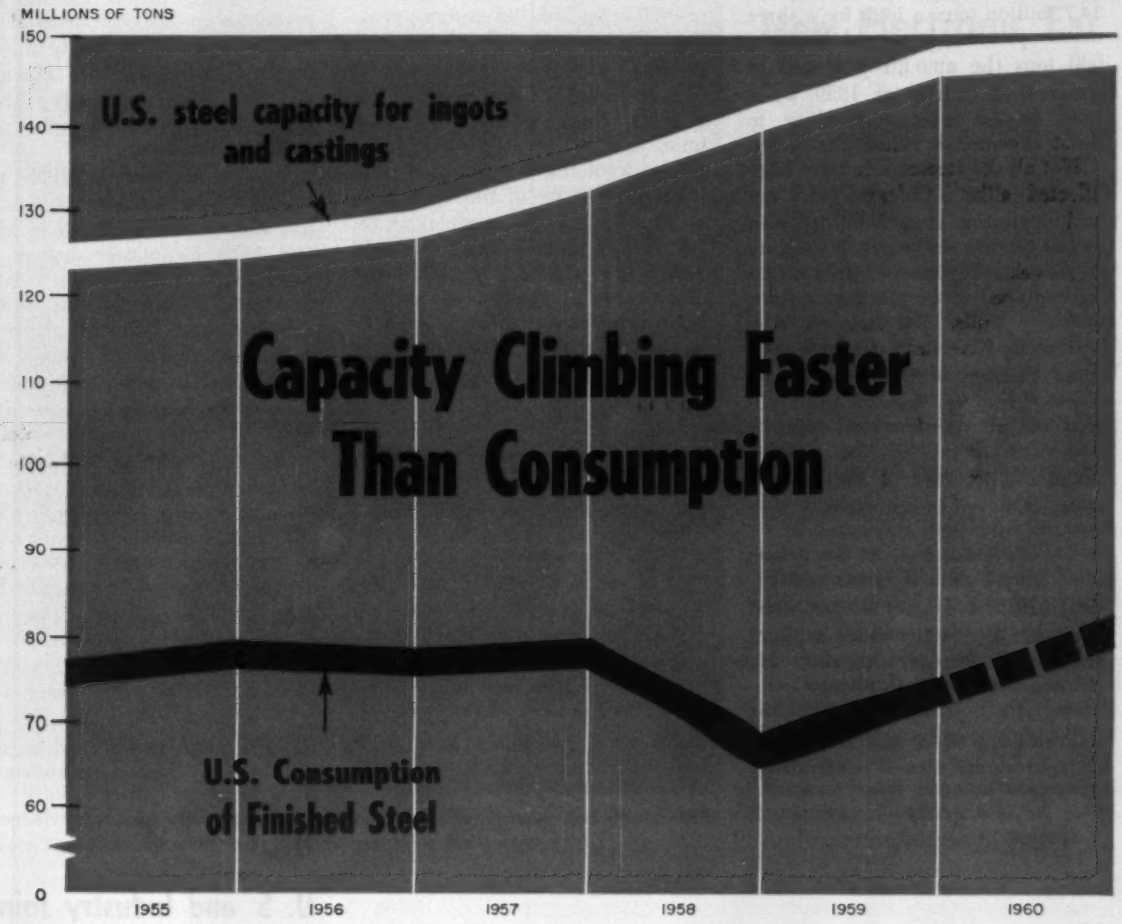
Write for revised Bulletin 26-T, which shows how Farval can extend both bearing and gear life on new machinery—as well as on older equipment now in use.

Farval Division • Eaton Manufacturing Company
3270 East 80th Street • Cleveland 4, Ohio

KEYS TO ADEQUATE LUBRICATION

Wherever you see the sign of Farval—familiar valve manifolds dual lubricant lines and central pumping station—you know steel mill equipment is being properly lubricated.





Why Steelmaking Rate Dropped

YOU CAN'T EXPECT the steel industry to operate at near capacity levels for more than three months without a letdown.

Reason: The industry's *production* capacity exceeds metalworking's *consumption* capacity.

If the steel industry were operating at 100 per cent of its 148.5 million ton capacity for ingots and castings, it would be turning out about 106 million tons of finished steel—products like sheets, tubing, rods, bars, and structural shapes.

The tumble in mill operations (from above 90 per cent of capacity at the end of March to slightly below 80 per cent this week) signals the end of the inventory buildup—see Market Outlook, Page 163. It means that production has moved closer into line with consumption.

Business has some soft spots—primarily due to auto production cutbacks. (March car sales, however, are up sharply.)

But by any yardstick, business is still good.

• **Steel Consumption High** — How good? You can get an idea from the finished steel consumption figures in the chart above. Estimated consumption is running at an annual rate of 80 million tons of finished steel—which tops the record 78 million tons consumed in 1955 and 1957. The figures include the tonnages of import steels consumed domestically.

Steel industry leaders are still confident they'll turn out better than 120 million tons of steel this year, topping the 117 million ton record set in 1955. But compare the operating rates: It took a rate of 93 per cent to produce 117 million tons in 1955; today, an 80 per cent pace would more than do the job.

• **New Record Output**—The Amer-

ican Iron & Steel Institute figures released last week indicated that first quarter steel ingot production hit 34.7 million tons, a high for a three month period. It topped by 949,000 tons the amount produced in the second quarter of 1959 when steel buyers were scrambling to build inventories before the strike.

Not all the steelmakers have been affected alike. Chicago mills are still operating at a high rate—an estimated 88 per cent of capacity this week. Youngstown area plants have dipped to 66 per cent. Some specialty mills, like stainless steel producers, have been cut back even more because of the drop in demand. Industry leaders point out that not all stainless steel capacity was shut down for the strike—about 30 per cent of the nation's capacity stayed in operation.

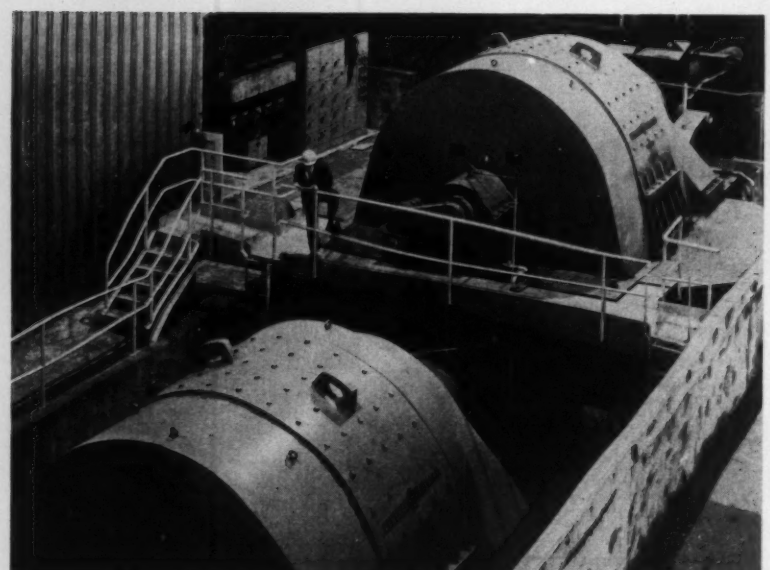
• **Buyer's Market** — At Bethlehem Steel Corp.'s annual meeting, President Arthur B. Homer touched upon the other key factor which explains the drop in the operating rate. He pointed out: "Our customers completed their inventory rebuilding following the strike quicker than we thought—and there's a tendency customers to carry less inventory."

A buyer's market has returned. And the consumer, seeing that the industry's capacity should permit quick delivery on most products, is re-evaluating his inventory practices. There's no strike threat, and it doesn't appear that prices will be increased before the end of the year. The consumer will be relying upon and demanding better, faster service from the steel mills.

Inventories are at the 18 million to 20 million level—steelmakers refer to this as the "normal band" (see STEEL, Apr. 11, p. 64). Some observers feel: Because of the steel industry's tremendous capacity, consumers may tend to try operating with slightly lower inventories than they have in the past.

• **What's Ahead**—How much lower can the steel mill operating rate go? It could fall to 75 per cent or slightly lower before the summer months. Business activity in the next 60 days will pretty much determine the level of operations during the summer months.

Commented one steel executive: "The way things look now, if we operate at less than 75 per cent very much of the time this summer, we'll be setting the stage for a climb back to the 85 to 90 per cent levels this fall."



TWIN DRIVES, made by General Electric Co., Schenectady, N. Y., power the new 104 in. plate mill at Lukens Steel Co., Coatesville, Pa. Two 40/80 rpm motors are employed

June Grad Pay Up

Accounting majors are the June graduates in heaviest demand this year, reports the University of Michigan's placement service. The number of job offers and starting salaries are higher than they were last year, says the university.

Salaries accepted in 1959 averaged $406 for bachelor degrees (offers this year range $375 to $500) and $518 for master degrees (vs. $435 to $525 this year). Arthur S. Hann, director of the Business Administration School's placement, estimates salaries of people with master degrees will rise 7 per cent, those with bachelor degrees 5 per cent. He notes that companies are recruiting for fields, with less emphasis on putting graduates into general training programs.

The university's engineering school reports a 6 per cent increase in recruiting visits to the college. Prof. John Young, engineering placement director, says the greatest demand is for electrical engineers. Their starting salaries will average $547.

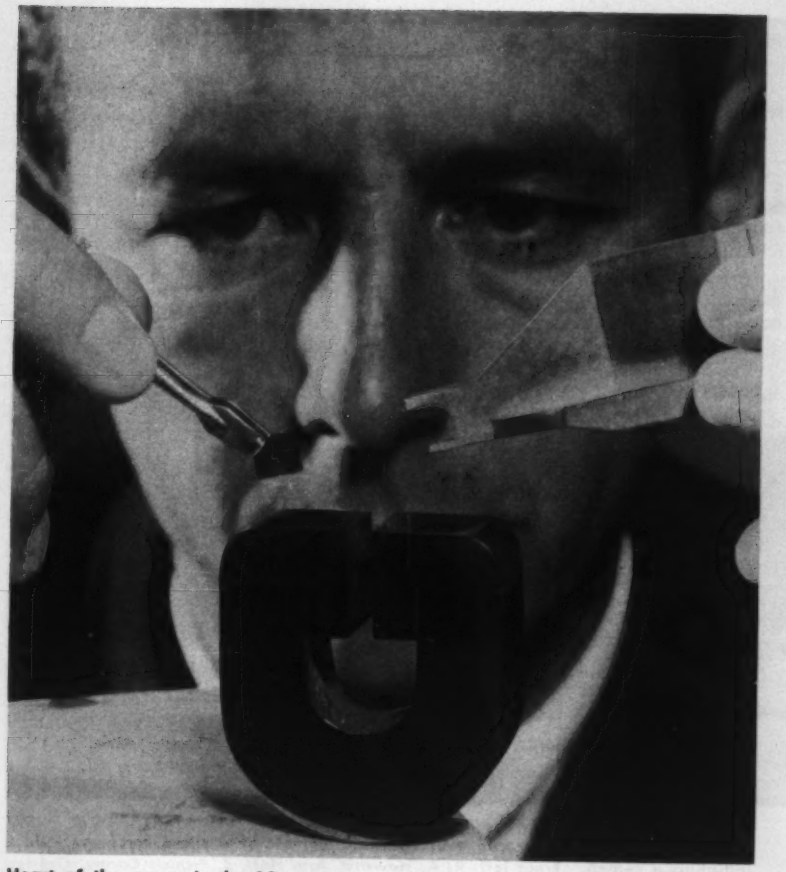
In a Penn State University poll, 325 firms indicated a need for more graduates with computer knowledge. The firms said they'd have 4000 jobs requiring such knowledge by 1970.

U. S. and Industry Join To Spur Export Trade

The Department of Commerce has named five business leaders to head up its new Export Expansion Committee.

The committee will organize an export drive by business, enlist the support of national and local business groups, discover areas in which better results can be obtained, assist and encourage businessmen new to the export field, strengthen contacts with business groups abroad, and develop an organization to implement those objectives.

Members are: Leonard F. McCollum, president, Continental Oil Co., Houston; Rudolph F. Bannow, president, National Association of Manufacturers, New York; Donald K. David, vice chairman, Ford Foundation, New York; Arthur H. Motley, president-elect, Chamber of Commerce of the U. S.; Morehead Patterson, chairman, American Machine & Foundry Co., New York.



Heart of the maser is the 12 ounce magnet in the foreground and the half-inch square crystal of synthetic ruby and copper transition section

–452° F Sharpens New Electronic Ear

A MINIATURE electronic ear, supercooled for high fidelity, will soon be tuning in faint radio signals from outer space.

The superdetector is a 25 lb ruby maser (short for microwave amplification by stimulated emission of radiation) developed for the Army Signal Corps by Hughes Aircraft Co. Earlier masers have required a large vacuum pump and a $4000 magnet weighing up to 500 lb. The new model does the same job with no pump and a 12 ounce magnet costing about $10.

In operation, the ruby is cooled to minus 452° F by liquid helium. The ultracold makes the atoms and electrons in the ruby move in slow motion. "Noisy" collisions of atomic particles are held to a minimum, making the signal booster almost static free.

The device, which can detect radio beeps from space vehicles millions of miles distant, can extend the sensitivity and range of many Army electronic systems tenfold.

Complete ruby maser amplifier, at left, is housed in this container, where the crystal, near absolute zero, "listens"

Army radarscopes operated on ruby maser amplifiers will be ten times more sensitive to approaching missiles

Professional man hunters talk over the requirements of a client company before initiating a search. From left: R. A. Howard, Ann Hoff, J. Francis Canny, Gorden G. Bowen

Professional Man Hunters Tell You How to

'Keep Us from Stealing Your Executives'

Editor's Note: Today's severe shortage of executive talent has led to an unprecedented outbreak of pirating—one company looting another's managerial ranks. And—more than ever before—industry is calling on professional recruiters to search out, and hire, needed executives. STEEL asked a leading executive search firm, Hoff, Canny, Bowen & Associates, New York, to spell out the company practices that have proved most effective in holding onto good men. The talent hunters tell you "how to keep us out of your plant."

JOHN S. earned $12,000 a year as chief industrial engineer for a medium size manufacturer of electrical equipment. He turned down an offer of $16,000 for a like position in another firm. His reasons: ". . . the ever present challenges I face now, the knowledge that top management will always listen to my ideas, and the long term growth potential of my present company."

GRADY H. left a $23,000 job with a consumer products manufacturer to take an $18,000 position in a smaller firm. His reasons: "I wanted responsibility more than I wanted money. Besides, my wife was unhappy in the other community and we were dissatisfied with the school system there."

Those two cases point up six of the vital factors a man considers in choosing between two jobs. There are at least a dozen others that you must weigh in creating an atmosphere in your company that will keep your good men from quitting.

• **Why Pirating Is Prevalent**—The supply of executive talent has failed to keep pace with the nation's postwar industrial growth. Many firms have failed to train executives to take over when top men die, retire, or quit. And many new types of industries have sprung up. Those developments siphon off the managerial cream from companies who fail to keep their managers satisfied. Even companies that continually keep the pipelines filled at the far end with college recruits—and train them well—are having difficulty filling top posts with qualified men. And industry faces a decade of

"people problems." The 35 to 45 age group—from which most managers are picked—won't expand significantly until after 1970. Result: Many companies may find themselves in the position of the good king's ships —sunk, after being pirated.

• **How to Protect Yourself**—Like the tycoon who hired a burglar to teach him how to keep from being robbed, STEEL asked the partners of a leading executive recruiting firm, Hoff, Canny, Bowen & Associates, New York, how a company could keep talent hunters away from its executives.

Here are the precautions members of that firm suggest. . .

• **Define the Manager's Job.** Develop an organization guide that spells out each executive's responsibility and authority. Advantages: Less overlapping, better coverage of all necessary functions, ease of pinpointing responsibility, elimination of politics, speedier communications.

• **Keep the Manager Informed.** "Communication is the almighty tool that'll help you hold onto good men," notes Mr. Canny. He points out that a man will quickly become dissatisfied if he is not told about things that concern him or his area of responsibility.

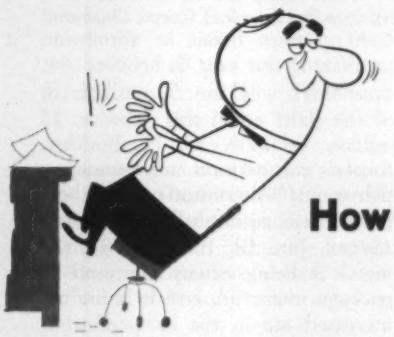
• **Don't "Use" Your Managers** — Some companies hire "names" or degrees for prestige purposes. Miss Hoff tells about one firm that hired two of the top men in its field for prestige purposes, paid them well, but failed to give them the responsibility and authority they deserved. They quit. Another firm hired a man with an impressive background to "give its salesmen something to brag about," but lost two of its best men who resented the high salary and status given the newcomer. Miss Hoff tells about another firm that lost effective managers because the president put them on 24 hour call —would sometimes telephone them in the middle of the night to ask one question.

• **But Use Their Ideas** — Perhaps the surest way to lose a good man is to fail to listen to—and implement—his ideas. That doesn't necessarily have to be done through channels. It's sometimes best to let the man present his idea to the person with the power to decide on it. Many men quit because their ideas are stolen by their supervisors and passed along to the top as the supervisor's own ideas. And don't set up a "suggestion system for managers" and pay them for their ideas. That's an insult to a good manager, contends Mr. Bowen.

• **Give Them Problems** — Many young executives turn down higher paying jobs because they are learning, preparing themselves, solving problems, and meeting challenges in their present positions, notes Mr. Canny. They enjoy that—and it becomes an important form of compensation.

• **Be Appreciative** — The president who has the theory that "anyone can be replaced" will probably have to do a lot of replacing, Mr. Canny warns. When a man does a superlative job, he wants to be told about it. And you should show your appreciation for consistently good performance. Also, don't take your long service people for granted, Mr. Bowen admonishes.

• **Cut "Friendship Ties"** — Mr. Bowen tells about one company whose good managers are always "on the make." As soon as they develop good backgrounds, they're ready to find new employment, because, as one put it: "I didn't go



How Professionals Find Executives

Four times as many companies use professional recruiters to find executives today as in 1955. There are at least 75 professional search firms in the country. Here's how they operate: 1. Company contacts recruiter. 2. Recruiter visits company, studies its organization, talks with top executives. 3. Recruiter helps company define the job and type of individual needed. 4. Recruiter begins the search. Large scouting firms keep elaborate files on executives. They are tapped first. Then inquiries are made in industry. Leads are screened, references checked. Tests may be given. 5. Candidates who seem qualified are interviewed—often, their wives are too. 6. Two, three, or four top candidates are recommended to the company. It usually makes final selection and extends job offer. The process generally takes 60 to 90 days.

The usual fee: Around 20 per cent of the annual salary of the man being hired. Some companies keep recruiters on retainer. The client pays the fee, whether or not it hires candidates offered.

While the talent hunters' work has generally become accepted, some still draw sharp criticism for their methods. To combat unethical practices in the field, a group of leading search firms formed the Association of Executive Recruiting Consultants last fall.

to Harvard with the old man so I'll never get a top job here."

• **Pay Them Adequately**—Just paying a competitive straight salary is no longer a sufficient form of economic compensation in many cases, the professional recruiters report. Many fringe benefits have gained great popularity. The base salary is of prime importance up to about $25,000 a year; then other forms of compensation become more important, Mr. Canny notes. He adds that the other forms are often necessary at much lower salaries. Among the "fringe benefits" frequently given: Stock participation, incentives, insurance, deferred compensation, club memberships, automobiles, memberships in associations and societies. Bonuses should always be based on performance—how much a manager stays below his budget, his volume of sales, sales volume in relation to cost of sales, return on investment in his department or area, the degree to which he has trimmed operating expenses. A static type of bonus has no incentive value, the recruiters point out.

• **Beware of Committees**—Forcing a man to go to too many meetings or participate on unnecessary committees may send him job shopping, the recruiters assert. Says Mr. Canny: "Figure out what those meetings are costing you—in executive time, in dollars lost because the men could have been doing something more productive, in men lost because they don't want to work in a 'committee management' type of organization."

• **Don't Shy Away from Decisions**—The recruiters tell about a paper company that has lost several good men because the top executives shy away from making decisions to avoid responsibility.

• **Use Open Door**—If the top executive is aloof, the company is in trouble, asserts Miss Hoff. Middle managers like to know that they can approach the top man any time they feel they really must. But just having an "open door" doesn't solve the problem. As one man put it (when he took a new job offered by the recruiters): "When I took a problem in to the president, we would just sit and chat; he always listened to me, but never solved my problem."

• **Don't Put Men in an Arena**—Sometimes a top executive will pit two managers against each other with the thought that the one who comes out on top is the "most promotable," the recruiters report. Says Miss Hoff: "That's a poor procedure. It ruins efficiency, creates tensions, leads to poor health, and doesn't necessarily prove anything. It'll often cause both of the men to look for new jobs."

• **Avoid Politics**—Create an atmosphere of frankness; never sanction underplay; be fair in making decisions. One of the best ways to avoid politics is to keep the men so busy with challenging work that they don't have time for such things, Miss Hoff notes.

• **Give Inspiration**—The top man in an organization must act as a catalyst, says Mr. Bowen. He must continually inspire and encourage his management team. He must delegate responsibility, develop teamwork, boost morale, train and broaden his management people.

• **Watch Geographic Features**—Men frequently accept new jobs just to get a change of scenery. Geography is important to most managers. Many will refuse to go to the deep South, the recruiters report. Most scientists like a campus atmosphere; many other men prefer a big city. Bad school systems frequently contribute to a man's seeking a new position. And be careful of the wife's desires. "Companies generally haven't paid nearly enough attention to the wife, considering the amount of power she wields," notes Mr. Canny.

• **The Key**—Mr. Canny sums it up: "The management group having a good reputation throughout its industry for success, leadership, progressiveness, ability, and flexibility will seldom lose its key men. It's important that a company enjoy a reputation for quality products, stability, growth, progressiveness, and a good profit record."

• If you'd like to have a copy of this article, write to Editorial Service, STEEL Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.

Aluminum Set Major Attack

THE ALUMINUM CAN, a serious contender for a bigger share of the growing can and container market, may be on the threshold of the biggest year in its history. One of the big "ifs": The acceptance of new lines of seamless, extruded containers which canmakers will introduce this year.

Most aluminum cans are of the conventional, three piece type, with a cemented side seam. An impact extruded model, with no side seam subjected to packing pressure, gave the light metal its first share of the large beer can market; it may be the key to acceptance for hermetically packed food products. The new technique will appear this year in pressurized, aerosol containers.

American Can Co. will introduce a 7 ounce model for dentrifices and shaving cream this spring. Continental Can Co. may produce an extruded version this year, probably an aerosol job too.

• **What They Think**—Kaiser Aluminum & Chemical Corp., Oakland, Calif., sees a boom in aluminum canmaking this year. It believes that canmakers will use 50 million lb of the light metal this year vs. 15 million in 1959. C. H. Buckley, Kaiser's can division sales manager, points out: "Aluminum cans for beer have been successfully introduced (STEEL, Jan. 12, 1959, p. 70); the metal is being extensively used to package motor oil, and it is finding increased use in the food industry. Aluminum containers have been utilized in growing numbers for packaging sardines, cheese, and various food specialties, and are now being used for packaging frozen food products."

Paul Murphy, vice president of Reynolds Aluminum Sales Co., predicts the end product value of the aluminum packaging market, estimated at $180 million in 1959, will grow to $380 million by 1965.

"Foil - polyethylene combinations and aluminum cans will spearhead a packaging breakthrough this

to Launch on Can Market

year," Mr. Murphy said at the National Packaging Exposition at Atlantic City, N. J. He predicts: About 700 million units, using around 50 million lb of metal, will be made this year. Reynolds will complete its new container development center at Bellwood, Va., this summer.

• **Growing Market**—The packaging of motor oil represents the light metal's biggest can market today; industry sources estimate that refiners will buy more than 400 million 1 quart cans in 1960. Reynolds credits aluminum's first big break in canning to an Esso Standard Oil Co. (now Humble Oil & Refining Co.) order for 60 million 1 quart sizes in 1957. The company has adopted the light cans for almost 100 per cent of its motor oil packaging in Eastern markets; other Standard affiliates are happy with test marketing results, and they will probably adopt the aluminum container in other market areas.

• **Test**—This year, Libby-McNeil & Libby, Chicago, will probably give aluminum its most important trial to date in food packing. It will test market containers for its fall pack of frozen orange juice concentrate.

A number of food packers are experimenting with aluminum to learn more about the metal's effect on different foods and the possibilities for coating cans with protective linings.

Aluminum producers claim a cure for metal corrosion in fish canning, as well as an easy-to-open can for sardines, potted meats, and similar products.

M. Neal Burleson, Reynolds' product director for cans, estimates what aluminum packed products can mean to fruit canners with national distribution: They can reduce shipping charges from Florida by as much as $1 per 1000 cans. He predicts that at least 50 million, 6 ounce, orange concentrate cans will be placed in retail stores this year by three major producers.

• **Problems**—Most of the hesitancy being met can be traced to production and handling difficulties, rather than price differentials.

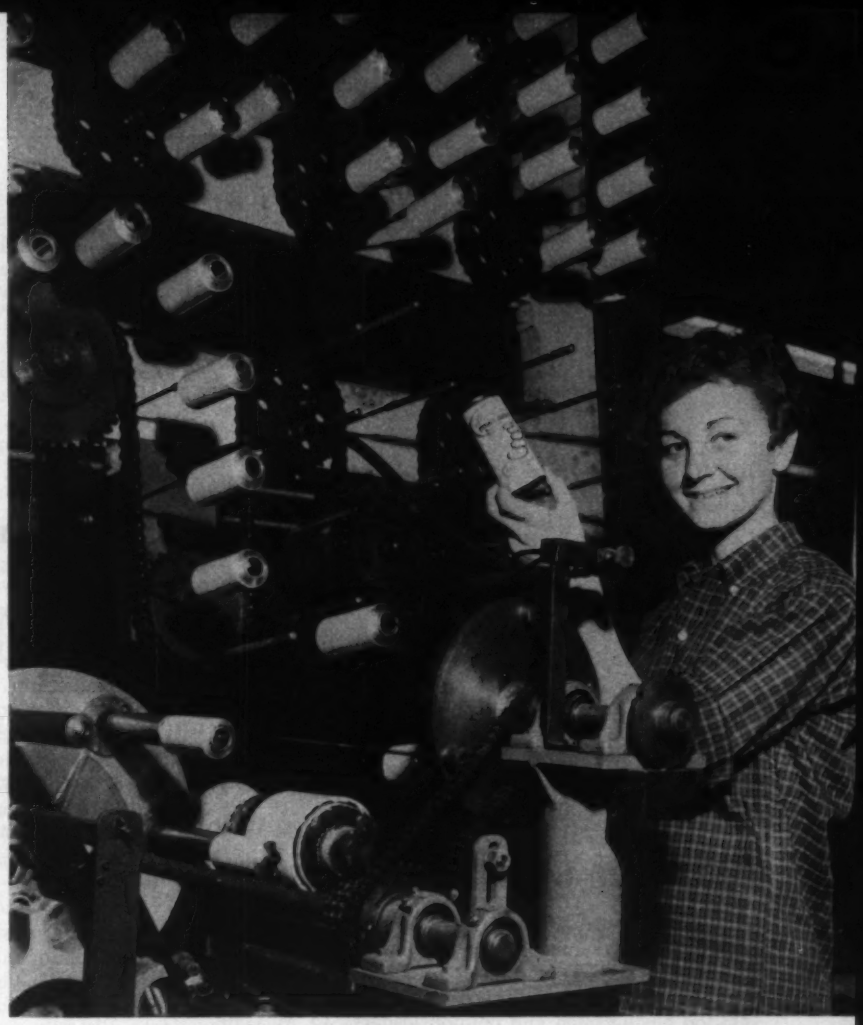
First, aluminum fabricating equipment will have to compete in fast company. Tin plate cans are rolled out at rates up to 30,000 units an hour.

Second, in some applications, it is estimated that aluminum must be beefed up 35 per cent in gage to prevent buckling and denting in service.

• **Outlook** — Aluminum producers will continue to push the development of new applications. Aluminum Co. of America, for example, is working to make the housewife aluminum container-conscious. One method: Aluminum-bound brushless dentifrices in pill form.

"The upsurge is coming," says Mr. Murphy, "and we're expanding aluminum can stock and slugmaking production facilities to meet the challenge."

Canmakers who predicted that aluminum would take 20 per cent of the 43 billion unit tin plate market by 1968 say that progress has been "a little disappointing" to date. Even though important market breakthroughs are expected by yearend, the bid for 20 per cent of the market may take some doing. In this industry, single percentage points in volume represent hundreds of millions of units.



American Can Co.

Have you Entered the $1000 Contest?

See Pages 5 and 6.

CARTER L. BURGESS

His query elicited a letter explaining . . .

How Our Defense Stacks Up

THE Eisenhower administration is making a new attempt to win support from business for its defense policies. It is responding to critics like Sen. Stuart Symington (D., Mo.) by circulating a letter among 600 top businessmen and opinion leaders. O. M. Gale, special assistant to the Secretary of Defense, wrote it to Carter Burgess, president, American Machine & Foundry Co.

For corporate defense planners, the letter has significance over and above its political implications. Mr. Gale not only spells out the administration's defense strategy, but he gives some strong hints of the direction our defense policies will take in the 1960s—if the Republicans continue residence in the White House.

The Bomber-Missile Fight

Mr. Gale makes it clear this nation will continue to emphasize its bomber force because missiles are essentially offensive weapons. Once missiles are launched, warns Mr. Gale, there is no calling them back. But bombers can be put into the air, or maintained on air alert, and they may be recalled as international tensions subside. They also carry many times the explosive power of an Atlas and are more reliable.

With B-52s carrying Hound Dog missiles, Mr. Gale says the bomber combines the best elements of both the bomber and missile. He claims the Russians have been "forced" to concentrate on missiles because they lack the overseas allies and aircraft carriers which make bombers effective.

Missiles will be emphasized only when they offer some of the advantages of bombers, such as mobility and control. The Polaris submarines and the Minuteman railroad launchers are less vulnerable to attack than fixed ICBM bases.

The Defense Department executive leaves no doubt that more Atlas birds would have been built if our security demanded it. He concludes that there is no gap between our defense and the Russians' at this time. Rather, he suggests, that the Russians must be worried about how they can overcome our deterrent strength.

Changing the Missile Mix

In recent weeks, the administration has downgraded the Bomarc defense system and upgraded advanced missile detecting devices like Midas. Other changes in our missile mix will be made as technology permits. Mr. Gale sees the Polaris program proceeding at an orderly rate of three operational subs per year. Two will be operational in 1960. The B-58 will be used, not canceled or cut back more as some have feared. There will be at least 27 squadrons of Atlas and Titan missiles in operational status by 1963-65. The Minuteman will come into the forces by 1963. The Hound Dog equipped B-52 will be operational this year.

Accepting the possibility that the Russians could launch 300 missiles against us at one time, Mr. Gale implies that our deterrent forces could be destroyed. However, he hints that the Russians do not have the facilities to launch that many birds at once and that the reliability necessary to hit everywhere at one time is impossible at this time.

With the emphasis on bombers, it is difficult to understand the department's cutback of the B-70, Mach 3 bomber. But Mr. Gale notes that the door is not completely closed on the $5.5 billion project, which could produce an operational aircraft by 1967-68. The Air Force has reinstated at least one contract which was canceled when the program was cut back, so odds are that the plane will be developed.

Where Is the Army?

Mr. Gale attempts to answer the many serious questions that have been raised about the Army's position in the Space Age. On the subject of limited wars, he suggests that only a little force need be displayed in operations like Lebanon or Quemoy because the enemy always knows the full nuclear potential of the U. S. stands behind the Marine or Army battalion which lands. The defense executive relies heavily on the 200 allied divisions presumably at our disposal.

Army modernization: He admits the department is not proceeding as fast as the Army itself would like, but he points out that delivery of new battlefield missiles like Davy Crockett, Little John, Sergeant, and Redeye begins in fiscal 1961. The Army will also get 180,000 of the new M-14 rifle in the next fiscal year.

Strictly routine...

for a

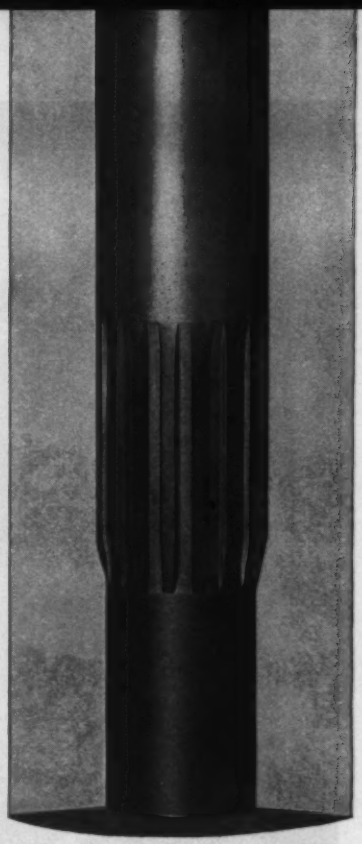
Cincinnati Intraform

Here are two different ID's separated by a blind spline . . . with part after part formed to ±.0005" tolerance for size and concentricity

You'd have to call for separate rough boring operations (watch the tolerances closely), a push broach operation, and a couple of internal grinds to produce the workpiece shown . . . *or call for a Cincinnati® Intraform!*

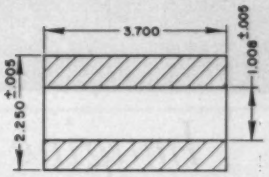
Not only would your Intraform produce this, and similar complex internal work, *in one continuous operation*, but to tight tolerances and at a high repetitive rate. Furthermore, you'd receive a part having superior metallurgical properties. Cold forming by the Cincinnati Intraform produces an uninterrupted grain flow, resulting in a part with higher fatigue life, and with excellent surface finish improvement.

Next time you're called upon to produce a run of parts having complex internal shapes, cross off conventional machining methods and call for a Cincinnati Intraform. (It gives your design men greater freedom, too.) For all details, write direct, or contact a Meta-Dynamics Division field engineer.

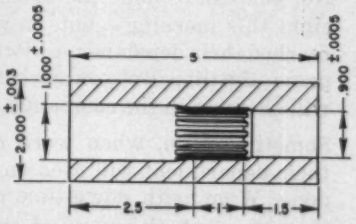


Section of steel shaft showing internal forming.

FACTS ABOUT THE JOB:



Starting blank of SAE 1040. ID tolerance, ±.005"; ID finish, 40 microinch.



Finished Intraformed part. Tolerance of ±.0005" held on ID's and overall concentricity of the three internal formed areas. ID finish, 16 microinch.

Intraform
META-DYNAMICS DIVISION
Machines for Metal Forming and Heat Treating
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio, U.S.A.
CINCINNATI

Imagine the odds management is bucking!

No, you can't blame the men. They clocked in at eight this morning – but, as yet, the work hasn't reached their department. Pitching pennies at least passes the time. But you can bet that game of theirs will show up in the company's P and L!

Sometime soon, when work *does* come through, their department will need an extra shift to get it done. What with down-time one week and overtime the next, the game of chance management's playing is hardly penny-ante.

Too bad this company didn't know about Automatic Keysort Data Processing! With Automatic Keysort's weekly work-load summaries, management would have been aware of the exact situation in every department in the plant. Knowing *on time* which were due to be light, and which overloaded, they could have acted *fast* to arrange schedules, transfers, extra shifts. Being informed of things almost as they happened, they could have kept production moving smoothly—and profitably.

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To learn more about Automatic Keysort Data Processing, call your nearby Royal McBee Data Processing Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, New York for brochure S-500.

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NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

PRODUCTION EFFICIENCY

Others Get It With Depreciation Reform . . .

WHY NOT US?

AMERICA'S depreciation laws are like the weather: Everybody complains about both, but nobody does much about either.

But something should and can be done about depreciation.

• **Why:** The U. S. tax climate has severely buffeted our production ef-

(*Please turn to Page* 92)

SWEDEN

You may deduct in any year any depreciation up to 30 per cent of the undepreciated value of machinery. More than half the cost can be written off in the first two years. You may also take as little depreciation in any year as you choose—5 per cent one year, 30 per cent the next. But you must apply the same percentage to all machinery in the year. The declining balance method is used, based on original cost. You may also depreciate by the straight line method, with a five year writeoff.

BENELUX

The Benelux nations are laissez faire in approach. Belgium categorizes equipment by type but arrives at specific lives by negotiation. Five years for equipment is common. In the Netherlands and Luxembourg, the normal depreciation rate is 10 per cent a year, but anybody with a good case can negotiate a better percentage. The straight line method is usual in Benelux, on the basis of original cost.

FRANCE

The taxpayer can choose between two systems, but he must stick with whatever he picks until 1965: 1. The "constant annuity" allows you to depreciate on a straight line for the asset's life, which is usually ten years for equipment. Shorter terms are easy to get. 2. "Degressive writeoff," recently enacted, permits you to depreciate at whatever rate the asset depreciates on the market. In the first year, perhaps as much as 50 per cent can be written off.

WEST GERMANY

Bonn permits liberal asset lives, usually between five and ten years, for equipment. Even shorter lives can be negotiated. Straight line, declining balance, and sum of digit methods are all permitted—on the basis of original cost.

GREAT BRITAIN

The system is adjusted frequently. In the current tax year, a 20 per cent investment allowance on new equipment may be taken in the year, and normal 100 per cent depreciation can be taken over the remaining life, usually ten years for standard equipment. Thus, 120 per cent of the cost can be taken in deductions. Either the straight line or declining balance method is allowed. When equipment must be written off in more than ten years, a first year writeoff of 10 per cent is legal.

JAPAN

While asset lives normally permitted are long—14 to 20 years for most metalworking equipment—special laws permit depreciation to be accelerated by 30 to 50 per cent. In some cases, half the value may be written off in the first year. Straight line or declining balance methods are O.K. Because of inflation, Japan has allowed revaluation of assets, but the last time that was permitted was Jan. 1, 1954.

ITALY

Equipment is normally depreciated over ten years. Lives may be shortened by not more than 40 per cent if your case is good, or if yours is an expansion project.

UNITED STATES

Theoretically, all equipment must be depreciated upon the basis of government-decided schedules of useful lives that haven't been changed since 1942. The average for machine tools is 20 years. Actually, companies with good records or good accountants and lawyers can often negotiate a better deal. The result is a crazy patchwork. One company with a turret lathe may depreciate it in 20 years, while another firm (perhaps across the street) may write it off in ten.

ficiency. The bulk of spending for equipment to improve that productivity is financed from depreciation reserves which are being eroded at the rate of $6 billion a year by federal policies.

• How: Our industrial competitors abroad have shown the way with legislation far more liberal than ours (see exhibit on Page 91).

STEEL has been campaigning on the "why" and "how" of reform since 1950. Our conclusion: Change will never come until you completely sell yourself and others on its need and feasibility. This article and the next (May 2) in the Production Efficiency series offer information designed to do that job. This one deals primarily with the why.

Why Reform?

Some 96 per cent of 700 metalworking executives polled by STEEL want reform. Even U. S. officials as high as Vice President Nixon admit the problem: "In this day of rapid technological change, we need more liberal treatment of depreciation for business taxation purposes. Only in this way can we stimulate the taking of risks by investing in new plants and equipment."

N. T. Harrison, treasurer of Jones & Lamson Machine Co., Springfield, Vt., estimates that depreciation reform could boost capital goods sales by more than $3.5 billion yearly.

Practically nobody denies that reform would:

1. Increase our production efficiency; more liberal depreciation allowances would make funds available for the purchase of machinery.

2. Put us on a better competitive footing with other industrial nations.

3. Help slow inflation by reducing production costs.

4. Free for more productive effort the manpower and energy now spent in haggling over writeoff allowances and salvage values.

Then why don't we get reform?

1. Because of inertia in industry, among the public, and in Congress.

2. Because industry can't agree on what reform it wants.

3. Because reform would cost us money in tax revenues in earlier years (but we would recover it later).

4. Because the damage being done by our laws isn't readily apparent.

Damage from Depreciation

U. S. depreciation policies erode America's industrial strength constantly, even if you can't see the day-to-day effects. Some of the damage:

• Capital Erosion — Depreciation taken for federal income tax purposes by all industry has been averaging about $15 billion a year. It should be $21 billion because inflation has boosted replacement costs that much. Annually, we must spend $6 billion above our depreciation allowances just to keep even, but not to improve our physical plant. The $6 billion comes out of profits, borrowings, and many other sources. All replacement funds should come from the depreciation reserve.

The effects of inflation are dramatized by the experience of one company (see accompanying exhibit). When it bought seven machines to replace old ones, it had to earn nearly $850,000 before taxes just to pay for the difference in costs.

• Slow Replacement—Capital erosion leads to slow replacement. Metalworking replaces its inventory of equipment only once every 28 to 30 years. Survey after survey shows industry would re-equip more frequently if it had the funds from depreciation reserves to do so.

A STEEL check indicates that metalworking wants to spend $20.7 billion on equipment this year but will spend only $5.65 billion.

• Obsolete Equipment—More than half our machine tools and related equipment are probably obsolete. Much of the blame for that rests with U. S. tax depreciation policy based on the concept of useful lives. Since 1942, the Treasury Department hasn't revised its schedules of useful lives (which you must follow unless you have good records to prove a case for shorter lives).

J. O. Ellison, president of American Machine Tool Distributors Association, estimates that machine tools made in 1940 had a ten-year life before obsolescence caught up with them. He believes that units made in 1950 had an eight-year span. He estimates that equipment made this year will be obsolete by 1965, so rapid is the technological advance.

Inflation

Old Machine	
64" turret lathe	
3" boring mill	
400 ton press	
20" engine lathe	
milling machine	
10' radial drill	
gear hobber	

How the Trouble Began

Before 1934, the Treasury Department paid little attention to tax depreciation.

The matter became important in 1934 because the U. S. wanted money to finance early New Deal projects. With so little to tax in the midst of depression, Congress proposed an arbitrary percentage reduction in depreciation allowances.

Takes Its Toll

How one manufacturer must earn $844,112 before taxes to pay higher costs of seven replacement machines

Date Bought	New Machine	Date Bought	Cost of Old	Cost of New	Difference	Amount Needed Before Taxes to Earn Difference
. . . . 1922	66" turret lathe	1954	$9,922	$78,795	$68,873	$172,183
. . . . 1912	3" boring mill	1956	2,926	35,468	32,542	81,355
. . . . 1915	600 ton press	1957	2,000	25,991	23,991	59,978
. . . . 1929	20" engine lathe	1957	4,055	33,296	29,241	73,103
. . . . 1947	milling machine	1957	19,470	53,916	34,446	86,115
. . . . 1926	12' radial drill	1958	15,333	68,520	53,187	132,968
. . . . 1925	gear cutter	1958	8,588	103,952	95,364	238,410
	7 Machines, Totals		$62,294	$399,938	$337,644	$844,112

The Treasury countered with a proposal to raise the same amount of money "administratively," by making it hard for taxpayers to establish allowances. The idea was adopted and embodied in Treasury Decision 4422. It puts the burden on the taxpayer to support his claims for useful lives. In those days of spotty records, he often couldn't support his claims.

"It was a revenue-raising device pure and simple," says Joel Barlow, Washington lawyer who presents U. S. Chamber of Commerce views on tax matters. "It had nothing to do with the merits of one system of depreciation over another."

As interpreted by zealous revenue agents, TD 4422 became a club to beat taxpayers into unreasonable patterns of depreciation. Obsolescence was virtually removed as a factor in arriving at the useful lives over which an asset could be written off.

The unhealthy situation was compounded by the 1942 edition of the Treasury's Bulletin F. It contains tables purporting to give the "useful" lives of all kinds of assets. The lives are too long because they were based on experience of the 1930s and earlier. The average life stated for machine tools, for example, is 20 years.

That system born in the 1930s has drastic results when applied today. It means your company may be taxed at an actual rate of 80 per cent instead of the statutory rate of 52 per cent, charges Frank V. Olds, Chrysler Corp.'s assistant comptroller. The overtaxing is primarily a result of inadequate allowances for depreciation which force corporations to overstate their taxable income.

Since 1952, three partial reforms have been enacted:

1. Treasury regulations and rulings reduce to some extent the burden imposed by TD 4422.

2. The Internal Revenue Code provides for two new methods of depreciation. The double declining balance approach and the sum of the years' digits permit you to write off the cost of an asset more rapidly during the first years of its life than

under the traditional straight line method. But they have no effect on the length of the period—the life—over which the total writeoff must be made.

3. In 1958, liberalized depreciation allowances were provided for annual investments up to $10,000.

"While those were steps in the right direction, they solve in only a partial way the basic problem," says Mr. Barlow.

In fact, Treasury has been backsliding somewhat. Since the reforms in methods allowed for depreciation, Internal Revenue Service agents have been tightening up in other areas. Many taxpayers have been confronted with retroactive salvage adjustments, extended depreciable lives, and disallowance of capital gains treatment when an asset has been sold at a price greater than its depreciated value.

Treasury even says there ought to be a law about capital gains. It proposes that profits from the sale of depreciated property be treated as ordinary income instead of a capital gain. Most sellers of such equipment would pay a 52 per cent tax on the profit instead of 25 per cent. In return, Treasury promises to instruct its Internal Revenue agents to show more heart in dealing with the taxpayers' judgment and practices on depreciation rates and salvage values.

The vagueness of the proposal has aroused many, particularly small business proponents. As a result, the measure has been shelved, and prospects are bleak for any kind of action on depreciation this year.

Carry on the Battle

We need to carry on the fight for depreciation reform whether it comes this year or next. The first necessity is to keep pounding away at the problem—by buttonholing Ways & Means members and Treasury officials so they won't forget the urgency of the problem. The second necessity is greater unanimity within industry on the kind of reform it will support.

Industry has done a poor sales job on reform. Few general businessmen testified last year when Ways & Means was holding hearings on tax matters, including depreciation. You can remedy that when the report on the hearings is ready—probably this fall. The job then will be to let Congressmen know how you feel and what you want done about reform.

At last year's hearings, dozens of depreciation reform proposals were made, to the confusion of committee and staff members. Chances for action will be enhanced if solid support is thrown to one or two.

STEEL will help clarify the situation in its next article on Production Efficiency. Some 700 industrialists are being polled to learn which type reform they prefer. The four most popular are:

- **The Bracket System**—It abandons the concept of useful lives. The system substitutes brackets or maximum or minimum limits for 10 or 15 categories of depreciable property, as in Canada. You could pick any year within the bracket.

- **The MAPI Plan**—Developed by Machinery & Allied Products Institute, it retains the present useful life concept, but allows faster writeoffs by the triple rate declining balance method.

- **Reinvestment Depreciation** — When the property is retired, you can deduct from earnings the difference between its value in current dollars and its cost at the time it was acquired. The deduction is allowed only to the extent that an equivalent investment is made within two years of retirement.

- **Initial Writeoff** — This approach permits the taxpayer to amortize 20 per cent of the cost in the first year of acquisition. Present laws limit the asset's cost to $10,000 for a corporation.

Ideas from Sweden

This Scandinavian country has one of the best depreciation setups in the world. "In the areas of liberal depreciation schemes and taxation to help stabilize the business cycle, Sweden has adopted pioneering tax devices that seem to work," says Martin Norr, research associate at Harvard Law School and editor of its "World Tax Series."

"The fundamental theory of the Swedish corporate tax structure: There are matters more properly left to the discretion of business than determined by a rigid, detailed statute or by the views of government administrators. It is astonishing that this is the approach of a government that for many years has been in Socialist hands!"

The essential elements of the Swedish system are flexibility and liberality—there is no Bulletin F. Subject to liberal ceilings, it's within discretion of the enterprise to determine how and when it writes off its machinery, points out Mr. Norr. Five-year writeoffs are not limited to defense facilities.

Just how far the system contributes to production efficiency can't be proved statistically. But annual productivity per worker is higher in Sweden than anywhere else in Europe. And Swedes credit depreciation with much of the good showing.

Mr. Norr notes: "Taking France as a base of 100, productivity per worker is 141 in Sweden, 106 in the United Kingdom, 96 in West Germany, and 77 in Italy."

We are far, far away from the tax climate in Sweden. But we need it to win lower taxes, faster modernization, and more safeguards against rapid obsolescence. We must prove to our government officials that U. S. depreciation weather is eroding our production efficiency.

Production Efficiency

How to Get It with Depreciation Reform

On May 2, STEEL will deal with the problem of how to accomplish this much needed reform. For a free copy of any or all articles in this Program for Management (running every other week since Jan. 11), write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. By using material like this, you may win $1000. For details, see Pages 5 and 6.

REVERSOL 1133-5X

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...a tough coolant

...for a tough job

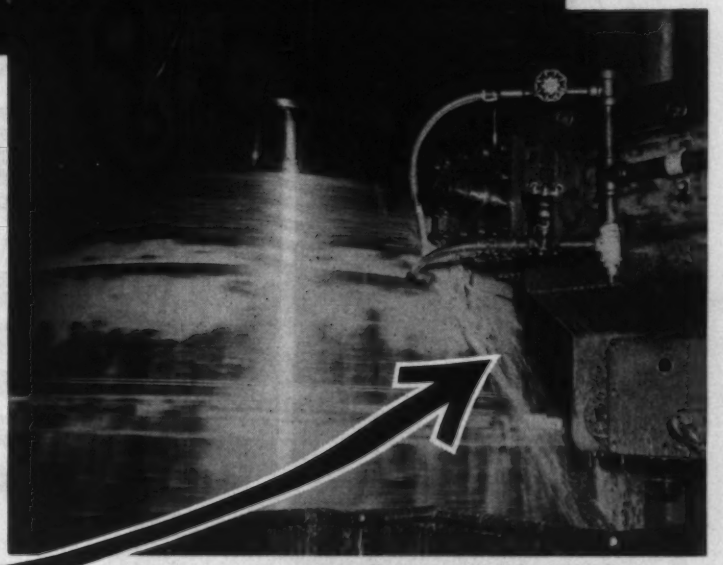

Photo courtesy of Budd Co., Red Lion Plant.

If you are machining René S41 and other special alloys, you will require extreme film strength lubrication. REVERSOL 1133-5X is a high film strength coolant used with water to impart the required lubricity, tool life, cleaning, rustproofing and longest service life for all cutting and grinding operations without staining the metal.

REVERSOL 1133-5X is used in spray mist cooling applications, too, and it can be used straight or as a soluble oil where a variety of metals are being machined. This unusual product is another outstanding result of HARRY MILLER CORP's research and development program for better metalworking coolants.

In this operation, REVERSOL 1133-5X coolant succeeds where all other coolants failed. It keeps the metal from tearing and maintains a finish on the following:

Operation: Machining a section of a pressure vessel
Material: 4340 carbon steel, approx.: 48" dia.
Speed: 97 rpm
Feed: .020
Depth-of-cut: .080
Tool: Carbide
Machine: Giddings & Lewis, Double Head (with side rail) Boring Mill
To achieve a 63 finish: Speed: 100 rpm
Feed: .009, Depth-of-cut: .020.

Write, wire or call for full details on REVERSOL 1133-5X *and other* HAMICO *products for metalworking.*

REVERSOL 1133-5X:

- is reversible—can be used straight or emulsified
- is suitable for both ferrous and non-ferrous metals
- will not discolor non-ferrous metals
- is excellent rust preventive
- wets out metallic silt, prevents floating
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- provides cooler work, highest production, longer tool life

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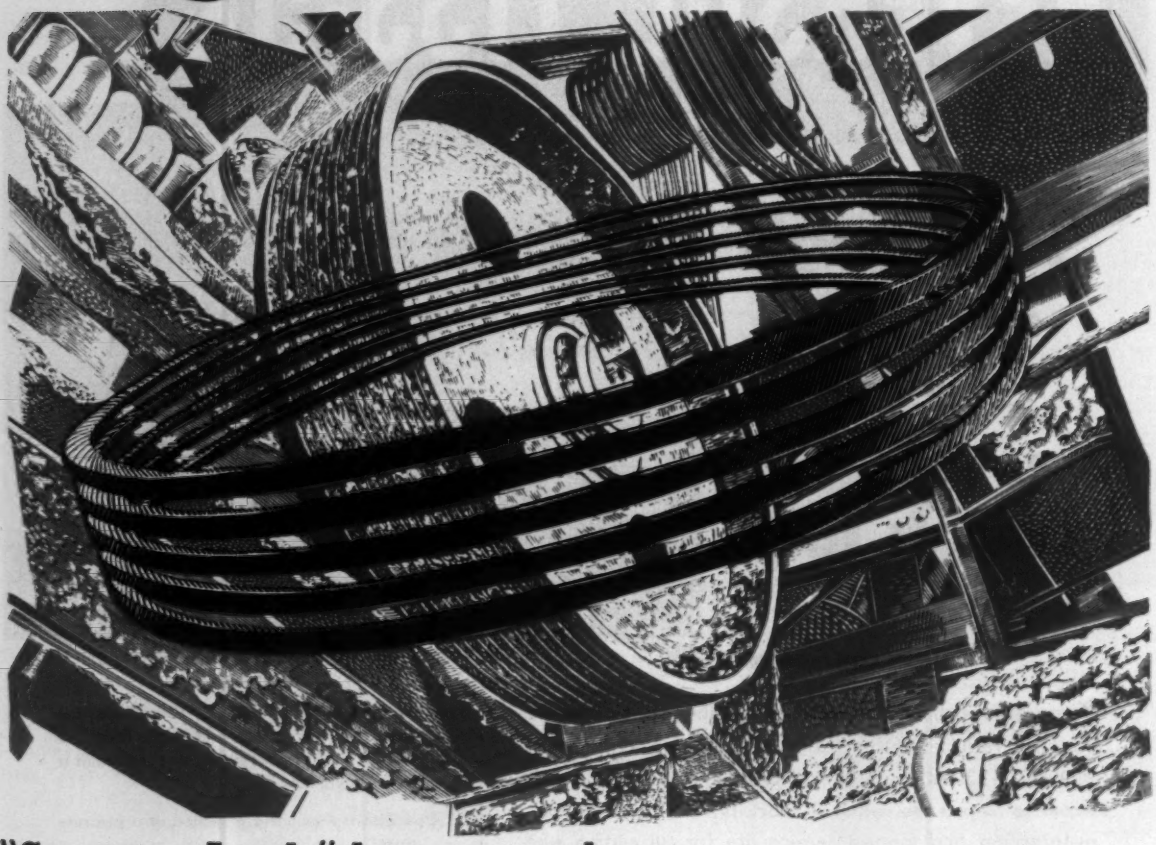

"Swinging Loads" demonstrate how

balanced driving power pays off

The flywheels on stone-crushing machinery at the Bethayres Concrete Products Company in Bethayres, Pa., put V-belts under a "tremendous strain."

Not only must each set of 8 U. S. Royal V-Belts driving the flywheel operate under extremes of abrasive conditions, it must also operate on constantly changing centers. As incompressible foreign matter enters the driven rollers, they swing or oscillate to allow passage. The result is constantly changing tensions under pressures amounting to many tons!

Yet even with this constant change in tensions and the severity of the abrasive conditions, the U. S. Royal V-Belts continue to share the load for an average of one year of rock-breaking service.

The C-210's used on these V-sheave to flat-surface drives, like all of the approximately 250 "U. S." belts in 48 different sizes used throughout the Bethayres plant, have a built-in advantage. "Balanced driving power"... the result of specially developed manufacturing equipment that automatically controls weight, dimensions, density, length, and tension members... helps provide a uniformity, toughness, length stability and true-running smoothness that have paid off in job after job, plant after plant the nation over.

Put balanced driving power to work in your own operations. See your "U. S." Power Transmission Distributor for full stocks and expert service.

U. S. Royal V-Belts and engineering assistance for these drives supplied by "U. S." Distributor Lindsay-Oberholzer of Philadelphia, Pa.

Visit Booth 1324, Design Engineering Show, New York Coliseum, May 23-26.

Mechanical Goods Division

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WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

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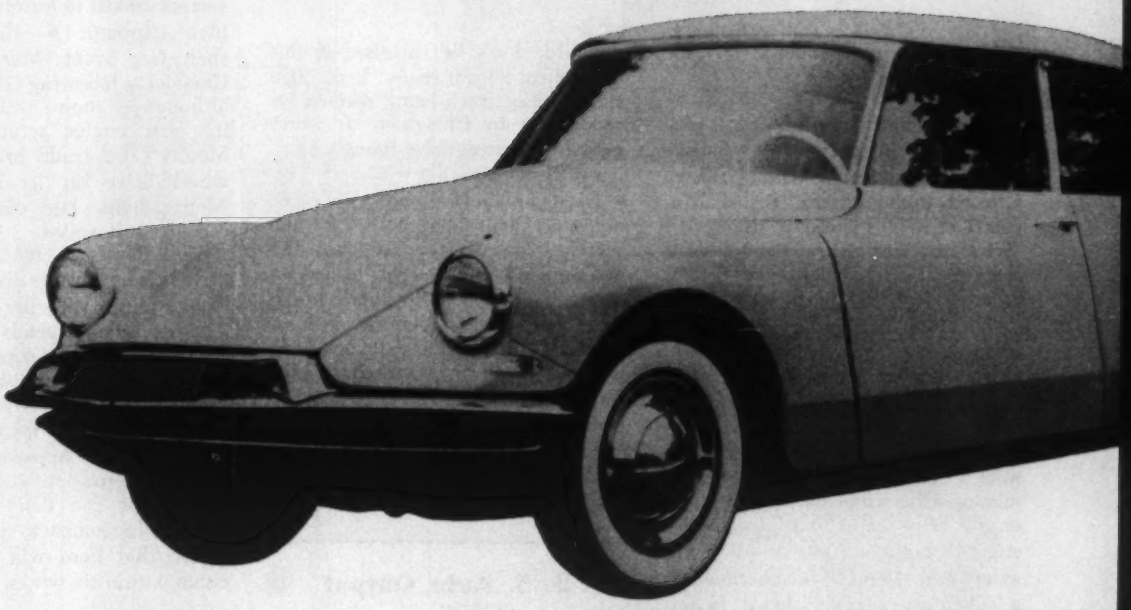
Will Front Wheel Drive Return to Detroit?



Success in foreign cars, like the Citroen, has revived interest

MOTORDOM believes the front wheel drive may return. Cord was the last U. S. built car to feature a front mounted differential; it folded in 1937. Several European makers still favor it. Now Ford is investigating front wheel drive for the 1600 lb light car it's thinking about producing (STEEL, Feb. 8, p. 60). Detroit's jesters say: With Chevrolet pushing the rear engine Corvair, Ford almost is forced to pull for the front wheel drive.

To metalworking, front wheel drive means flat floorpans, no propeller shafts, constant velocity instead of universal joints, more independent coil suspension components. It definitely means unitized bodies and split axles. Present engines and transmissions can be adapted, but new differentials probably would have to be designed. Several engineers have told STEEL that the transaxle is a natural for cars that put the drive train up front.

• **How It Works**—Unless it's a Corvair, the American built car you're driving today has the engine, transmission, and torque converter (if it's an automatic shift) up front. A propeller shaft transmits power to the rear mounted differential, which in turn delivers it to the rear wheels. Rear axles are one piece instead of split.

With front wheel drive, the propeller shaft is eliminated and the other components are all mounted in the front. Most designs place the differential between the engine and transmission for better weight distribution and easier handling. Split or swing axles commonly are used and the front wheels pull the car along. Most front wheel drive

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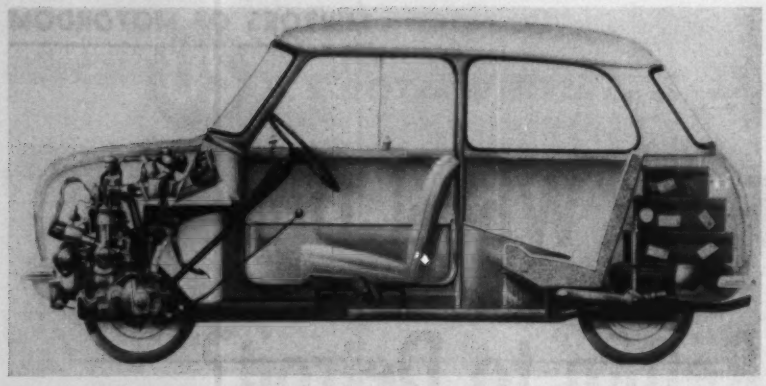


Cutaway view of the 10 ft long Austin 850 and Morris 850 reveals space for four adults and their luggage. The four-cylinder overhead valve engine provides front wheel transmission. Body is unitized construction

cars feature independent coil suspension.

• **Who Uses It**—European producers who favor front wheel drive include SAAB, Auto Union, DKW, Citroen, and Panhard. British Motors Corp. introduced it in its 850 series cars last year. Renault and Peugeot use it in light van trucks. So does Italy's Alfa Romeo.

The Renault job has two design features that are particularly interesting to four wheel drive proponents: 1. The transaxle arrangement of the four speed, synchromesh, gearbox and differential permits a more compact engine-transmission-differential package. 2. The entire drive train unit (including engine, radiator, transaxle, swing axles, and wheels) is mounted on a subchassis that's fastened to the truck underbody with eight bolts. A similar subframe, containing the entire rear axle (split) and suspension assembly, is fastened to the rear of the car with four bolts. That makes for simple assembly and appears much less costly than conventional buildup methods.

• **Advantages** — Biggest advantages claimed for front wheel drive are more conventional and more responsive handling characteristics, better road stability, and simpler rear suspension. As Renault's experience shows, it also reduces assembly costs. Absence of a propeller shaft means flat floors which designers like.

GM's L'Universelle is a good example of what can be done in designing a van type truck if front wheel drive is used. Incidentally, don't be surprised if this experimental van body looks like the compact truck being readied for production by Chevrolet. It won't have front wheel drive though.

• **Disadvantages**—Opponents point out that while handling may be more typical of standard cars, the additional front end weight causes severe front end tire and brake wear and makes steering harder. That may be one reason why Ford is considering front wheel drive only for a light car. Power assists or complicated gearing look like definite musts if the system is used on heavier vehicles.

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,757
February	659,323	478,484
March	652,518	576,085
3 Mo. Totals	2,000,572	1,600,326
April	.....	578,825
May	.....	546,817
June	.....	557,994
July	.....	555,418
August	.....	239,152
September	.....	258,157
October	.....	507,530
November	.....	254,527
December	.....	494,931
Total	.....	5,593,677

Week Ended	1960	1959
Mar. 12	145,967	134,283
Mar. 19	145,852	135,466
Mar. 26	137,385	121,832
Apr. 2	147,830	133,878
Apr. 9	133,490†	133,202
Apr. 16	135,000*	135,934

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Front wheel drive also requires constant velocity joints like the Bendix-Weiss or Rzeppa instead of inexpensive U-joints. Con-Vel Div., Dana Corp., recently purchased the manufacturing rights to the Rzeppa joint and Detroit understands it's tooling up for volume production if Ford decides to go with its Segment III (Hummingbird) project as the light car is dubbed.

• **Outlook**—Right now, Ford is the only U. S. automaker seriously interested in front wheel drive. GM seems to be sticking with transaxle designs that can either be coupled to rear mounted engines like Corvair, or linked to a front end powerplant through a whip propeller shaft (see STEEL, Mar. 14, p. 63). Chrysler is following GM's approach although it shows little interest in the rear engine setup. American Motors Corp. could bring out front wheel drive on its British built Metropolitan, but plans for this car are still veiled.

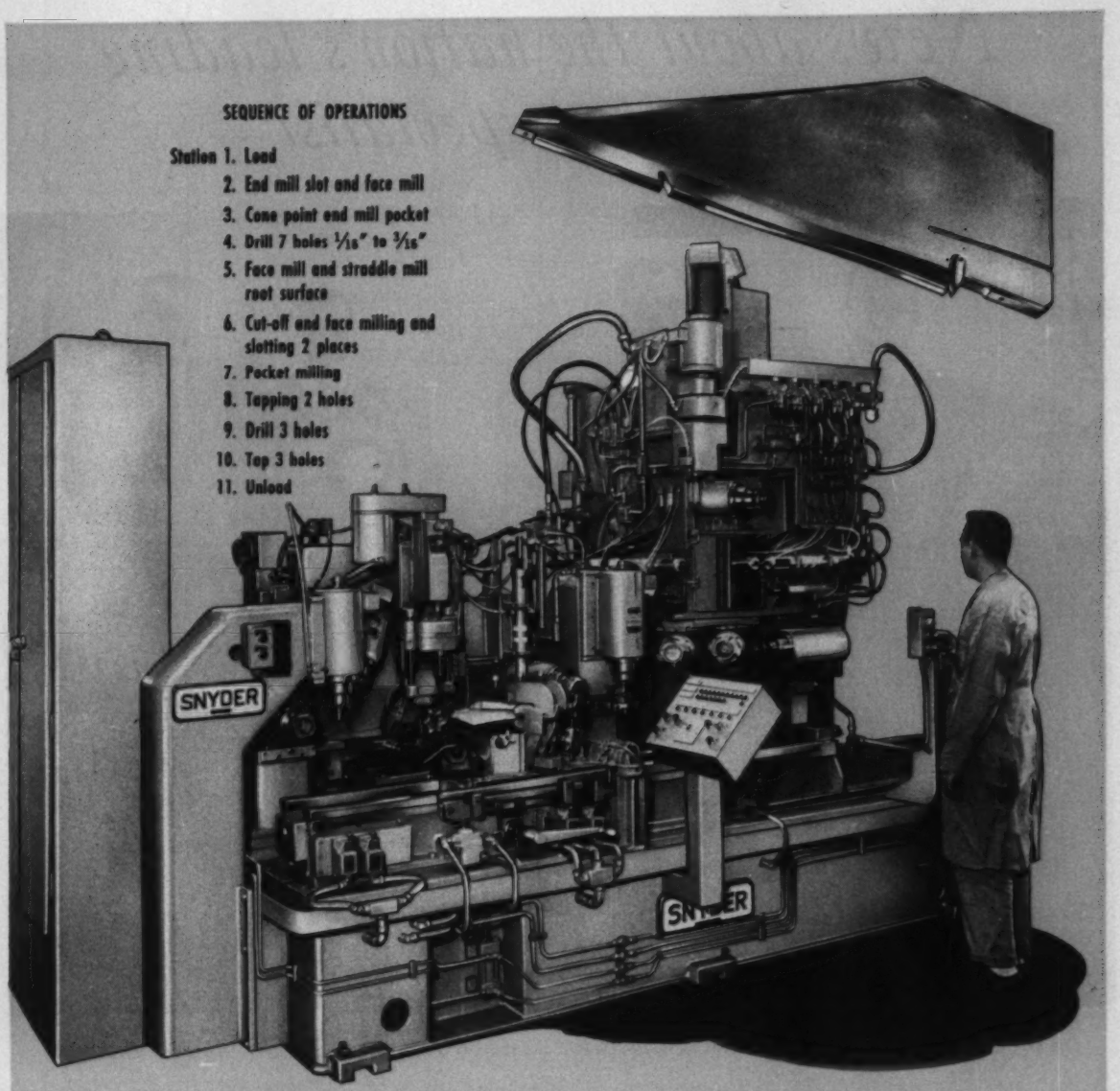
Will Ford go for front wheel drive? The answer seems "yes" if it goes ahead with the Segment III. The decision depends mainly on how well smaller foreign imports like Volkswagen and Renault continue to sell, say STEEL's sources. So far they show no real signs of slowing down. Apparently, this indicates there's still an untapped market for the domestically produced ultracompact car. It's rumored that Ford will make a decision within six weeks.

Rumor Circuit Reports

Mercury will drop the Park Lane series and regular Mercury lines will share the Ford body shell, but with a 120 in. wheelbase. Regular Fords will keep the 119 in. wheelbase, say tipsters.

Ford's smaller car is getting hot. No production tooling has been released yet, but indications are that the company will go ahead for 1962 introduction. If that's the case, look for initial tooling releases to break late this month or in May. Much of the tooling may be hidden overseas.

There's also talk that a small Anglia with a fiberglass body and front wheel drive is being developed in Britain strictly for the U. S. trade. This rumor is highly doubtful—should be discounted.


SEQUENCE OF OPERATIONS
Station 1. Load
2. End mill slot and face mill
3. Cone point end mill pocket
4. Drill 7 holes 1/16" to 3/16"
5. Face mill and straddle mill root surface
6. Cut-off and face milling and slotting 2 places
7. Pocket milling
8. Tapping 2 holes
9. Drill 3 holes
10. Tap 3 holes
11. Unload
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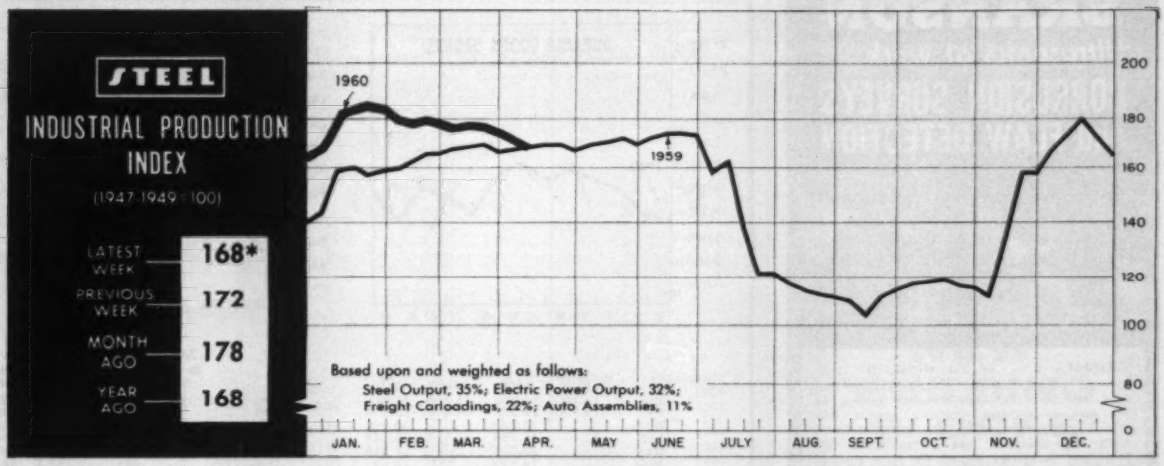

*Week ended Apr. 9.

Decline in Trend Line Nears End

STEEL's industrial production index is at the same level as it was a year ago, although there is one big difference. Last year, the trend line was moving upward. This year, it is moving downward. But the development does not necessarily mean that business in general is on the skids. The slump in the 1960 line (above) tends to override a number of crosscurrents in the business stream which indicate that total activity will remain at its relatively high level for some time.

The two elements which have grabbed most of the headlines—auto and steel production — are equally responsible for the 4 point drop in the index to a preliminary 168 (1947-49 = 100) for the week ended Apr. 9. The trend line has not been that low since the first week in 1960.

• **No Immediate Upturn**—Despite the numerous signs of a spring upturn in the economy, STEEL's index is likely to continue its decline. Reason: Steel producers have not yet found the level at which output matches consumption, although they may be nearing it. (See Page 81.) With consumption of metal still at a high level, a continuation of the recent steep slide in the steel operating rate would indicate that users are cutting significantly into their inventories. This does not seem likely because: 1. Steel stocks have not been built up enough to allow for much cutting. 2. Manufacturers' new orders are climbing (see graph and table, Page 102).

As for auto production, it won't get back up to the first quarter level, and it probably won't get much worse. Production schedules have been trimmed all the way back to the year-ago levels, partly by design and partly because of strikes and shortages of parts. If output this month is to meet expectations, the tempo will have to be stepped up a bit.

Latest news on sales may hasten the improvement. The drop in pro-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,277[1]	2,417	2,657
Electric Power Distributed (million kw-hr)	13,600[1]	13,542	12,604
Bituminous Coal Output (1000 tons)	7,505[1]	8,710	7,126
Crude Oil Production (daily avg—1000 bbl)	7,100[1]	7,151	7,127
Construction Volume (*ENR*—millions)	$356.2	$383.7	$338.3
Auto, Truck Output, U. S., Canada (*Ward's*)	169,896[1]	186,579	169,726
TRADE			
Freight Carloadings (1000 Cars)	605[1]	598	618
Intercity Truck Tonnage (changes from year ago)	+0 8%	−1.4%	+18.0%
Business Failures (Dun & Bradstreet)	356	286	284
Currency in Circulation (millions)[3]	$31,653	$31,534	$31,280
Dept. Store Sales (changes from year ago)[3]	+22%	−7%	−13%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$26,080	$24,480	$24,171
Federal Gross Debt (billions)	$286.7	$287.0	$285.8
Bond Volume, NYSE (millions)	$28.4	$26.8	$31.2
Stocks Sales, NYSE (thousands of shares)	14,638	12,208	15,626
Loans and Investments (billions)[4]	$101.0	$101.5	$103.3
U. S. Govt. Obligations Held (billions)[4]	$24.5	$24.8	$33.1
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	230.8	230.9	219.2
All Commodities[7]	120.2	120.1	119.7
Commodities Other than Farm & Foods[7]	128 9	128.8	128.2

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,844,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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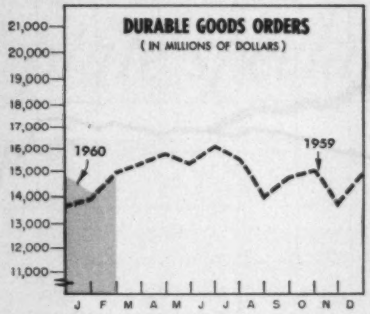
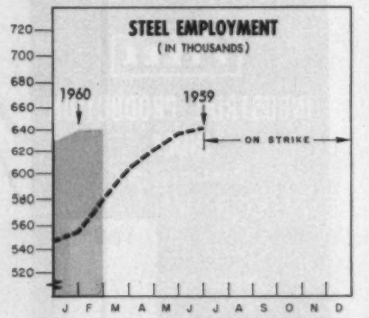
THE BUSINESS TREND



	1960	1959	1960	1959
Jan.	14,190	13,900	15,450	13,541
Feb.	14,800†	14,918	15,670†	13,870
Mar.	.....	15,323	.....	14,400
Apr.	.....	15,796	.....	15,166
May	.....	15,241	.....	15,515
June	.....	16,133	.....	15,771
July	.....	15,493	.....	15,384
Aug.	.....	13,974	.....	14,008
Sept.	.....	14,747	.....	14,113
Oct.	.....	15,099	.....	14,047
Nov.	.....	13,721	.....	13,479
Dec.	.....	14,770	.....	15,010

*Seasonally adjusted. †Preliminary.
U. S. Office of Business Economics.
Charts copyright, 1960, STEEL.



	Employment in Thousands		Payroll in Millions	
	1960	1959	1960	1959
Jan.	641	555	$398.8	$335.2
Feb.	643	580	381.4	333.9
Mar.	...	604	....	385.4
Apr.	...	621	....	385.5
May	...	635	....	396.9
June	...	641	....	398.2
July	...	n.a.	....	n.a.
Aug.	...	n.a.	....	n.a.
Sept.	...	n.a.	....	n.a.
Oct.	...	n.a.	....	n.a.
Nov.	...	n.a.	....	n.a.
Dec.	...	548	....	400.3

n.a.=not available because of strike.
American Iron & Steel Institute.

duction (from unusually high, and to some observers unrealistic, levels) has obscured the fact that sales are rolling along at a rate second only to that of record 1955. During the last ten day selling period in March —which included the first real break in weather in more than a month—the daily selling rate sailed to 26,000 units, raising the March figure to 21,323 units a day, 10.2 per cent above February's rate. It, in turn, was above January's. At the current sales pace, the 1-million-plus inventory of new cars is equal to about a 47.8 day supply. *Ward's Automotive Reports* points out that the level is not too far off the standard of the last five years for this season (40 to 45 days).

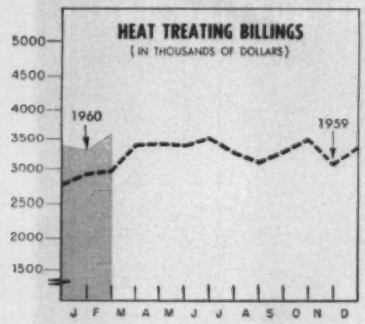
• **Seasonal Effects Hidden**—The decline in the production trend line also overshadows the seasonal trends in the remaining two elements in the index—output of electricity and railroad freight carloadings. In the case of electricity, the pattern is down from now until the heat of summer sets in—about mid-May, when air conditoners and fans are turned on. Counterbalancing that trend is a slow rise in carloadings. Once the ore boats get moving in larger numbers, the carloading segment will be a big factor in the eventual upturn of the index.

Unless there is a marked pickup in steel or autos, it looks like the industrial production index is destined to move in a narrow range around the current reading until late May or early June. A mild upturn could set in then and hold until the vacation season starts in early July.

Bankers See High Plateau

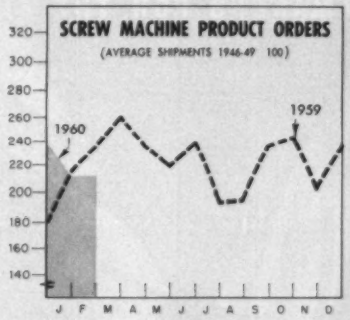
In terms of the nation's total economy, the mixed trends mean that the Federal Reserve Board's industrial production index "may well move in its February-March range for several months," observes the Morgan Guaranty Trust Co. of New York. (In February, it was 167 per cent of the 1947-49 base period. Rumor has it that the next report will show a downward revision of that figure and a further decline for March. STEEL's production index indicates the possibility.)

But the bank continues: "The evidence, while mixed, weighs on balance against an imminent downturn for there are still many elements of substantial strength in the economy, and there is little evidence of generalized excess. . . . The fact



	1960	1959	1958
Jan.	3,297.0	2,769.1	2,825.5
Feb.	3,585.8	2,828.0	2,466.3
Mar.	.....	3,397.3	2,490.5
Apr.	.....	3,420.6	2,538.0
May	.....	3,405.6	2,421.5
June	.....	3,518.5	2,367.3
July	.....	3,259.7	2,141.5
Aug.	.....	3,111.3	2,212.9
Sept.	.....	3,285.7	2,456.9
Oct.	.....	3,509.8	2,754.3
Nov.	.....	3,079.5	2,404.8
Dec.	.....	3,349.9	2,765.5

Metal Treating Institute.



	New Orders		Shipments	
	1960	1959	1960	1959
Jan.	209	215	220	193
Feb.	210	236	216	193
Mar.	...	260	...	214
Apr.	...	234	...	219
May	...	219	...	201
June	...	239	...	218
July	...	192	...	194
Aug.	...	194	...	205
Sept.	...	236	...	217
Oct.	...	243	...	243
Nov.	...	201	...	208
Dec.	...	237	...	225
Avg	...	226	...	211

*Preliminary.
National Screw Machine Products Assn.

that activity has fallen short of expectations in some areas has naturally caused disappointment, but the record has not been so bad as to warrant out-and-out pessimism."

Adds the First National Bank of Boston: "With record spending likely by consumers, by state and local governments, and by business for new plant and equipment, odds continue to favor a highly satisfactory business year as measured by gross national product. . . ."

Many economists claim that the leveling off at today's healthy but unspectacular pace enhances the possibility of maintaining prosperity over the long term.

Sale-Order Ratio Stable

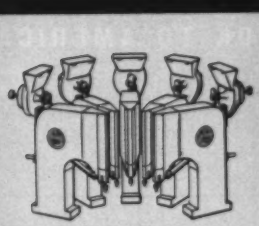
Evidence that feared excesses have not developed: The ratio of total sales to total inventories has remained practically constant for several months. Even though stocks have risen at a rapid rate since the settlement of the steel strike, sales (or production) have kept step. The ratio was 1.47 in February, the same as in December. Prior to each of the postwar recessions, that relationship has climbed past the 1.6 figure (inventories equaling 1.6 months of sales).

One area in the government's reports on sales causes some concern among economists: The lack of balance between production and new orders.

Both are heading up (seasonally adjusted), as the table on Page 102 (durable goods) shows, but production is going up faster. While production has practically regained its prestrike high, new orders are still well beneath that level. Says Morgan Guaranty Trust: "A favorable relationship between manufacturers' new orders and shipments is requisite for the expansion of business, making this an area that bears particularly close watching for signs of improvement in coming months."

Buyers Eye Good Year

If the results of the monthly business survey of the National Association of Purchasing Agents can be used as a yardstick, the sale-order ratio for March improved. But it was the result of a slowdown of production coupled with only a slight rise in orders. However, the buyers term both as being satisfactory, and there is general agreement that business for the immediate months ahead will be good but not booming.



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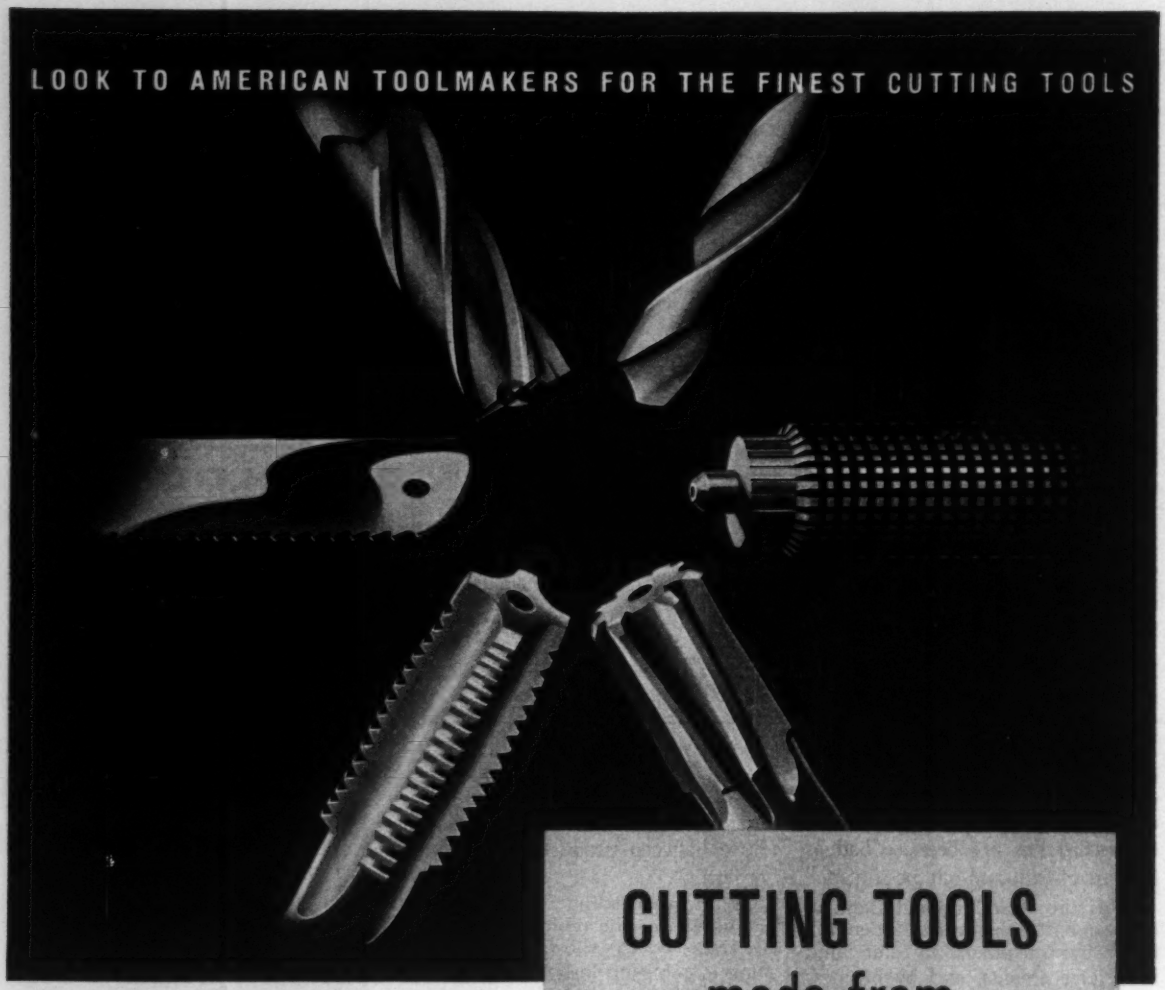

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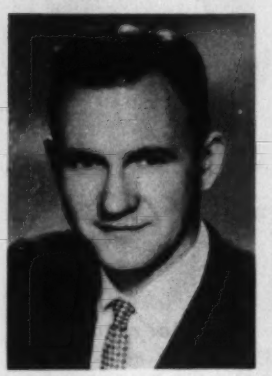
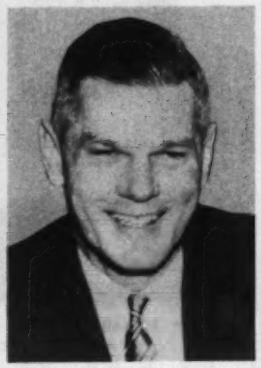


DONALD L. ERICKSON
Brooks & Perkins prod. mgr.



JOHN N. DAVIS
Armour Alliance div. post

ROBERT E. STEINMAN
Gaertner Scientific v. p.

JOHN B. SUOMALA
Gabriel Electronics v. p.

Donald L. Erickson was promoted to production manager, **Brooks & Perkins Inc.**, Detroit. His duties include production engineering, production control, purchasing and estimating. He was chief production engineer.

Robert T. Frisbie Jr. was elected executive vice president, **New Britain Machine Co.**, New Britain, Conn. He was vice president-sales. Appointments for the company's New Britain-Gridley Machine Div. include: **Frank H. Hastings** as sales manager; **Stanley M. Brown** in charge of the Cincinnati office; **Paul E. Kennedy**, assigned to the Cleveland territory.

Royal Industries Inc., Los Angeles, appointed **P. G. Smith** executive vice president and **Donald E. Butler** vice president-sales of its Royal Jet Div. in Alhambra, Calif.

Theodore F. Loughry fills the new post of manager of foreign operations for **Midland-Ross Corp.**, Cleveland. He was manager of foreign activities for Surface Combustion Corp., acquired by Midland-Ross last year.

Theodore R. Stutzman was appointed a vice president and works manager, **Erie Foundry Co.**, Erie, Pa. He was plant superintendent. Other appointments: **Karl F. Reed**, chief engineer; **Carl Hammon** manager, hydraulic engineering and sales; **Heinz Cornberg** assistant chief engineer. **MacDonald S. Reed**, vice president-chief engineer, and **Lysle F. Walker**, vice president-director of purchases, have retired.

John N. Davis was appointed plant manager, Coated Abrasives Div., **Armour Alliance Industries**, Alliance, Ohio. He was division manager, Abrasives, Adhesives, and Coating Divs., Minnesota Mining & Mfg. Co., Canada.

Robert E. Steinman was elected vice president of **Gaertner Scientific Corp.**, Chicago. He was with Charles Bruning Co. Inc., serving as product manager.

Harry H. Martin was named corporate director of purchases, **Sylvania Electric Products Inc.**, New York, subsidiary of General Telephone & Electronics Corp. He was general manufacturing manager, Sylvania Home Electronics, Batavia, N. Y., and is succeeded by **O. John Haynes.**

William F. Conway was made manager of production engineering at **Stromberg - Carlson's** Commercial Products Div., Rochester, N. Y. Stromberg-Carlson is a division of General Dynamics Corp.

A. F. Smith was named director of marketing for **A. O. Smith Corp.**, Milwaukee. He takes over as head of the Marketing Div. from **Stanley E. Wolkenheim**, resigned. **Robert Stime** was named to Mr. Smith's former post as director of merchandising. Named to head a new department, Economic & Marketing Research, within the Marketing Div. is **Don Bein.** Named director of the department, he formerly was in charge of the Research Economic Dept. in the company's Research & Development Div.

John B. Suomala was appointed vice president-engineering, **Gabriel Electronics Div.**, Millis, Mass., Gabriel Co. He was with the Instrumentation Laboratory at Massachusetts Institute of Technology.

Stanley-Humason Inc., subsidiary of Stanley Works, Forestville, Conn., elected **Frederick R. Downs Jr.** vice president-sales,; **Peter D. Prudden** vice president-manufacturing.

Mark Kaiander was named head of the Buffalo stamping plant, Metal Stamping Div., **Ford Motor Co.** He is succeeded as manager of the division's Monroe, Mich., plant by **Charles G. Hunter**, former production manager, Dearborn, Mich., stamping plant.

Electric Autolite Co., Toledo, Ohio, formed a Special Products & Research & Development Div. to facilitate diversification programs. Heading the new division will be Autolite director of research, **George E. Spaulding.** In the company's Wire & Instrument Div., **John M. Gerber** was named general manager, and **Edward A. McNally** in charge of plants at Port Huron, Mich., and Hazleton, Pa. **Earl L. Pressel** was named manager-manufacturing engineering, Toledo Div. **C. A. Degucz** was named director of Aero/Space sales.

Simonds Saw & Steel Co., Lockport, N. Y., named **David H. Mackey** general manager of its Steel Mill Div.; **Charles H. Emery** steel sales manager.

Eric Schmidt was made Midwestern

PAUL W. OLSON

GEORGE R. FRYE

general managers at Eaton foundry divs.

H. EDWARD EHLERS

WARREN A. ZIMMER

Joseph Dixon Crucible executive v. p.s

regional sales manager by **Stokvis-Multiton Corp.**, Port Washington, N. Y.

Paul W. Olson was appointed general manager, Marion, Ohio, Forge Div., **Eaton Mfg. Co.** He succeeds **T. A. Moretti,** transferred to special assignments at the corporate level. **George R. Frye,** former factory manager, Foundry Div., was promoted to general manager of the division in Vassar, Mich., to succeed Mr. Olson.

Appointed to the reliability staff of **AC Spark Plug Div.**, Milwaukee, General Motors Corp., are: **Jack Briner** as director of quality assurance and field service; **Milton L. Stratton** as chief inspector of supplier products; and **William Gahan** as field service manager.

Howard A. Davis was elected president of **Ardmore Products Inc.**, Roselle, N. J., subsidiary of Berry Steel Corp. He was vice president-sales. **Edwin M. Shaw** was made sales manager.

H. Edward Ehlers and **Warren A. Zimmer** were elected executive vice presidents of **Joseph Dixon Crucible Co.**, Jersey City, N. J. They were formerly senior vice presidents.

Richard A. Green was appointed vice president-general manager, **Pioneer Industrial Engineering Div.**, Pioneer Engineering & Mfg. Co. Inc., Detroit. For the last year, he was general manager of Douglas Tool Co., a division of Pioneer.

Thomas J. Behan was made manager of **Crucible Steel Co.'s** Buffalo sales branch to succeed **Charles J. Glassman,** who retires in June.

Wilbur Mayer, sales manager of the Monorail & Crane Div., **Louden Machinery Co.**, Fairfield, Iowa, subsidiary of Mechanical Handling Systems Inc., was elected vice president-sales.

John W. Elbin was made vice president-manufacturing, **AmForge Div.**, American Brake Shoe Co., New York. He is responsible for manufacturing and product engineering at the Upset and Great Lakes plants of the division. He was plant manager.

Walter H. Wheeler Jr. was elected chairman and chief executive officer, **Pitney-Bowes Inc.**, Stamford, Conn. **Harry M. Nordberg,** executive vice president since 1957, was elected president and chief operating officer.

John Sharp III was made supervisor of the electronic tabulating equipment at **New York Air Brake Co.'s** Aurora, Ill., Pump Div.

N. F. Mullaney fills the new post of manager of rail and advanced products, Automotive Div., **A. O. Smith Corp.**, Milwaukee.

Robert M. Purdy was named sales manager, Marine & Industrial Engine Div., **Chrysler Corp.**, Detroit. He was assistant sales manager, Detroit Gear Div., Borg-Warner Corp.

E. L. Argo was made sales manager-

HOWARD A. DAVIS

Ardmore Products pres.

WILBUR MAYER

Louden Machinery v. p.

JOHN W. ELBIN

AmForge mfg.-v. p.

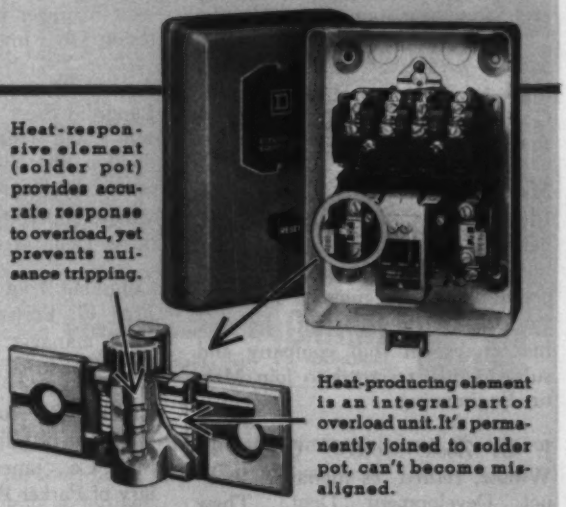
ROBERT M. PURDY

Chrysler eng. div. sales

ONLY SQUARE D STARTERS WITH ONE-PIECE OVERLOAD RELAYS GIVE ABSOLUTE PROTECTION!

• Only Square D makes thermal overload relays with 1-piece construction—and only with 1-piece construction can you *know* you've installed the heater correctly. Square D 1-piece overload relays can be installed only one way. They are factory-assembled, individually tested and calibrated, completely tamper-proof. Repeated tripping will not affect accuracy.

You *pay* for overload protection—be sure you *get* it. Insist on Square D 1-piece overload relays for *absolute* protection.



Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.

Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

EXCLUSIVE— 1-piece Overload Relay for *ABSOLUTE* Protection!

Mail coupon today for simple "jig-saw" demonstrator —see why only Square D gives absolute protection

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Please send me information on Square D magnetic starters, along with your simple 3-minute "jig-saw" demonstrator

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wherever electricity is distributed and controlled

NORMAN W. ECKHARDT *Barnes Mfg. marketing*

SAMUEL KRUTY *Dearborn Chemical prod. mgr.*

THOMAS E. O'NEAL *acting pres. of two firms*

plates and shapes for **Sheffield Div.**, Houston, Armco Steel Corp.

Norman W. Eckhardt was named to the new post of marketing manager, **Barnes Mfg. Co.**, Mansfield, Ohio. **J. H. Hulse Jr.** was made manager-water system sales, **W. D. Schneider** manager - pump sales, **S. J. Kelsey** manager-contract sales, **P. E. Finical** manager-advertising and sales promotion.

Samuel Kruty was made production manager, **Dearborn Chemical Co.**, Chicago. He was assistant production manager.

Martin Engineering Co., Neponset, Ill., appointed **Randolph L. Ruhley** field manager of sales and development. Former vice president and general sales manager, Branford Co., New Britain, Conn., he sold his interest in that company and subsequently resigned to join Martin Engineering.

J. D. Zook succeeds **Quincy J. Winsor**, retired, as manager, Product Development Dept., **Thew Shovel Co.**, Lorain, Ohio.

Friez Instrument Div., Baltimore, Bendix Aviation Corp., named **Arthur S. Pawling** factory manager. **E. R. Harrall**, former manufacturing manager, was named director of product quality and reliability.

Robert T. Pring was appointed to the new post of manager, dust collector sales, **Dracco Div., Fuller Co.**, Cleveland.

W. E. Weber was made Pacific Coast Div. manager for **A. M. Byers Co.** at San Francisco. He replaces **A. D. Sheere**, retired.

Thomas E. O'Neal was appointed acting president of both **Beals McCarthy & Rogers Inc.**, Buffalo, and **Follansbee Metals Corp.**, New York. He succeeds **Paul W. Evans**, president of Beals, who resigned because of ill health. Mr. O'Neal served Follansbee as assistant to the president-sales and as a vice president.

Eugene F. Scherr was named Midwest manager for **Western Precipitation Div.**, Joy Mfg. Co., Chicago.

At the Pittsburgh Works, **Jones & Laughlin Steel Corp.**, **C. D. Smith** was made assistant manager, Production Planning Dept. He is succeeded by **Samuel A. Ambler** as assistant superintendent of the Strip Sheet Dept. at the works.

Columbia Tool Steel Co. appointed **Fred G. Porter** Cleveland district sales manager; **Andrew M. Kane** Detroit district sales manager.

Chester C. Holloway was named president of **Gilman Engineering & Mfg. Co.**, Janesville, Wis., subsidiary of Parker Pen Co. He replaces **William C. Cummings** who joined the parent company as vice president and manager, Eversharp Pen Co., a division.

Earl C. Evans was made general manager, **Hanna Furnace Corp.**, Buffalo, division of National Steel Corp. **Harry O. Wicks** was made general superintendent.

R. A. Irwin was appointed director of space activities, a new post at **Westinghouse Electric Corp.** He is in Washington.

Charles H. McConnell was made assistant to the vice president-sales, **Weirton Steel Co.**, Weirton, W. Va.

Harold O. Schultz was named machine shop superintendent, **Waukesha Motor Co.**, Waukesha, Wis.

Gilbert E. Perkins was made production manager, **American Emery Wheel Works**, Providence, R. I.

General Electric Co. appointed **Lewis G. Zirkle** manager of manufacturing for heat processing equipment, Industrial Heating Dept., Shelbyville, Ind. He succeeds **Clarence M. Stevens**, recently named manager of manufacturing, Distribution Assemblies Dept., Plainville, Conn. **James E. Wilson** was made manager-special heat processing at Shelbyville to succeed **Richard A. Schaus**, named manager-fuel processing engineering for the company's Atomic Power Equipment Dept., San Jose, Calif.

Pennsalt Chemicals Corp., Philadelphia, elected **Hugh C. Land** a vice president. He was general manager of Pennsalt's Industrial Chemicals Div. Upon retirement Apr. 27 of **Fred C. Shanaman** as group vice president-West, Mr. Land will succeed him at Tacoma, Wash.

Robert E. Evasick was made manager of distributor sales, **Ulbrich Stainless Steels**, Wallingford, Conn. He was director of purchases and assistant general manager at Edgcomb Steel of New England Inc.

S. Lewis Doughty was made manager of electrochemical sales for **Lea Mfg. Co. Inc.**, Waterbury, Conn. He was Eastern manager.

OBITUARIES...

Joseph Lehner, 65, president, **Dayton Tool Co. Inc.**, Dayton, Ohio, died Apr. 7.

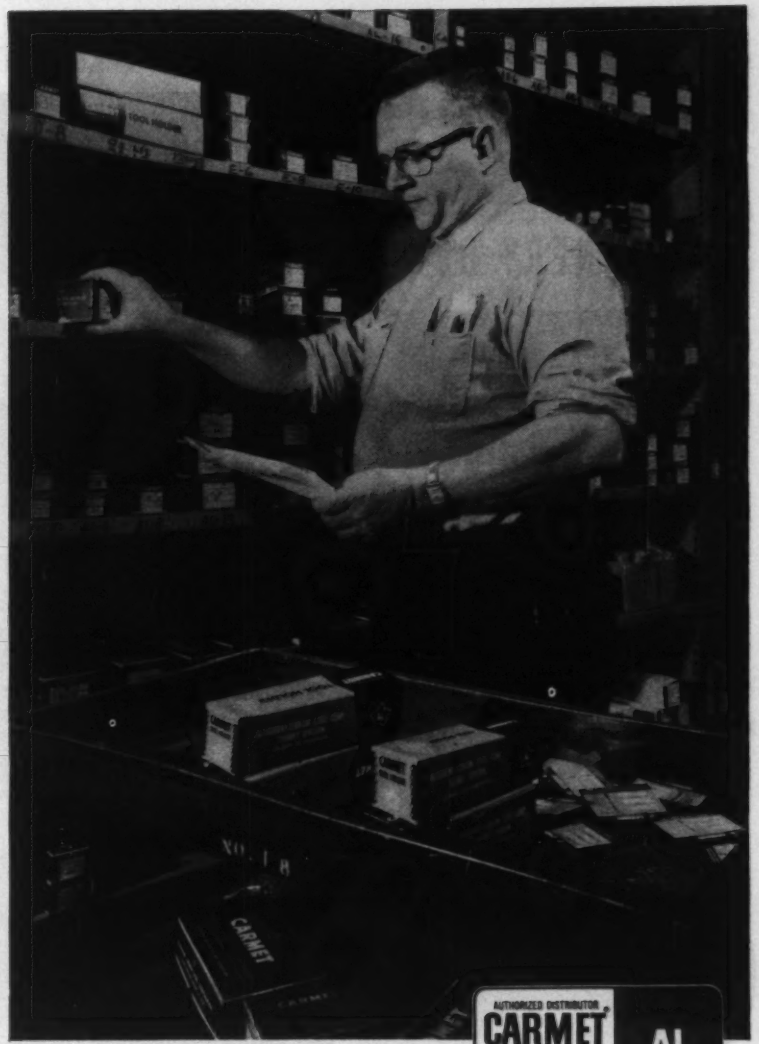
Elmer W. Dany, 56, vice president, Furnace Engineering Div., **Ferro Corp.**, Cleveland, died recently.

Theodore P. Hubert, 58, district sales manager, **Aluminum Co. of America**, died recently in Newark, N. J.

Robert L. Cashen, administrative vice president, **H. K. Ferguson Co.**, Cleveland, died Apr. 6.

H. A. Stoller, 60, export director of **Heil Co.**, Milwaukee, died Apr. 3.

Off-the-shelf delivery of Carmet® Carbide Tools from your local CARMET Distributor



Over 75 distributors, coast to coast, display this sign—service in your own local area.

Keep your inventory of Carmet Carbide Tools at a comfortable level. Keep your working capital free for other needs. Your Carmet distributor carries the load—that's how he's set up to do business.

He carries your needs from the complete line of Carmet Carbide Tools in all grades and every style. He is geared to deliver your orders quickly—a phone call gets action.

And if you get in a production jam, special service is his middle name. Remember, your Carmet distributor knows carbide tooling—with the help of the local Carmet technical man, you get all the help you need.

Your Carmet distributor handles the best Carbide Tools and backs it with the best service! ***Allegheny Ludlum Steel Corporation, Carmet Division, Ferndale, Detroit 20, Michigan.***

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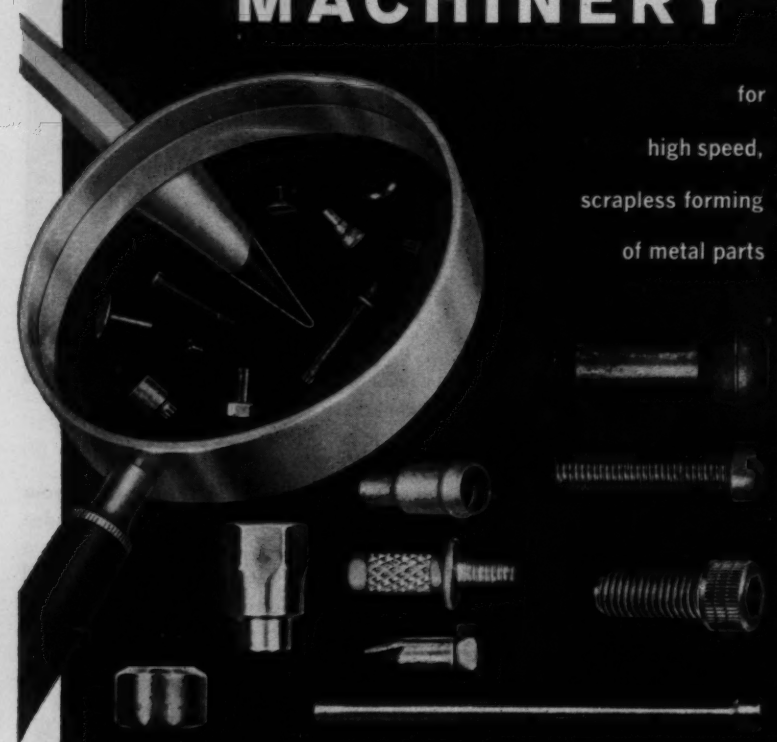
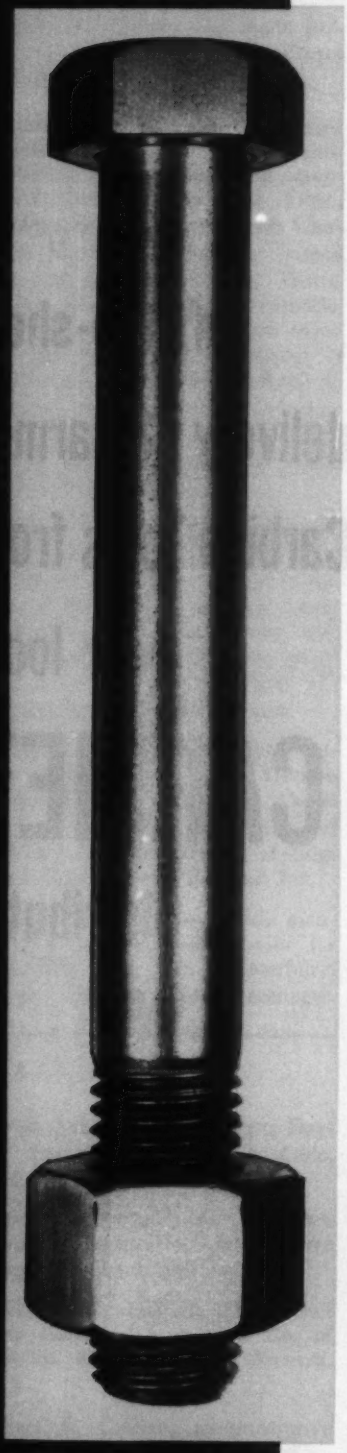
MACHINERY BUILDERS

BUILDS A WIDE RANGE OF

COLD HEADING MACHINERY*

for high speed, scrapless forming of metal parts





*includes: cold headers (single or double blow) progressive headers, nut formers, parts formers, thread rollers, slotters, trimmers, and pointers; also special purpose headers and auxiliary equipment

THE WATERBURY FARREL FOUNDRY & MACHINE CO.

Waterbury, Connecticut, U.S.A.

Sales Offices: Chicago • Cleveland • Los Angeles • Millburn, N. J.

Wheeling Steel Looks to Oxygen for Greater Yield

WHEELING Steel Corp., Wheeling, W. Va., is studying the possibility of replacing its bessemer facilities with an oxygen process. Such a move could boost its capacity to 3 million tons or more per year. Present capacity: 2.4 million tons.

Until a decision is reached, alterations of the bessemer converters at Steubenville, Ohio, to permit blowing of steam and oxygen instead of atmospheric air are continuing. Those changes together with improvements in open hearth practice will increase the firm's rated capacity to 2.5 million tons, the company has indicated.

The increasing need for oxygen led the firm to join with Hydrocarbon Research Inc., New York, in forming Mingo Oxygen Co., Mingo Junction, Ohio. It has under construction a $6 million plant that will have a daily rated capacity of 400 tons of oxygen with provision for expansion to 800 tons per day.

An increase in ingot capacity that might come with adoption of the oxygen process raises the possibility that Wheeling would require new finishing facilities to handle the potential increase.

The present alterations are expected to be completed this fall. They will permit production of a low nitrogen steel of open hearth grade with a wider range of application than the regular air blown steel. Such steel will greatly increase flexibility of operation, reports Paul W. Loenemund, vice president in charge of operations.

U. S. Firms Active Abroad

Carborundum Co., Niagara Falls, N. Y., and Pechiney of Paris, France, have concluded an agreement on the manufacture and sale of aluminum oxide. Carborundum will acquire a share of the capital of Les Abrasifs du Sud-Ouest, a subsidiary of Pechiney engaged in the manufacture of grinding, polishing, and finishing media. Under the agreement, Carborundum International SA, Geneva, Switzerland, is granted exclusive sales rights for products outside territories under French influence. Pechiney will receive technical help on the manufacture of aluminum oxide crude, grains, and powder.

Union Carbide Corp., New York, is building a plant in Priolo, Sicily, to be operated by S.P.A. Celene, jointly owned with Societa Edison, Milan. The new facility is expected to have an initial capacity of 25 million lb of propylene oxide annually for plastic and automotive markets. The plant is situated adjacent to Celene's other plants, which include facilities under construction for the production of solvents and plasticizers.

Stainless Strip Output Up

Stainless & Strip Div., Jones & Laughlin Steel Corp., has almost tripled production at J&L's Youngstown plant with a newly installed annealing and pickling line, reports E. V. Mort, general manager of production. The new line will be used primarily for annealing and pickling JL430 moulding stainless steel strip for automotive and other applications. Secondary use will be for annealing and pickling the chrome-nickel 300 grades. The line is equipped with three uncoilers and may be set to process 8, 12, or 24 in. widths of stainless in three, two, or one strand operations. Annealing temperatures range between 1500°F for the 400 grades to more than 2100° F for the 300 grades.

Firm, Division Parted

Westover Corp., Milwaukee, separated from its foundry division, the Nomad Equipment Div. The firm will be devoted entirely to management service work (work measurement, methods, plant layout, and cost control consultation for metalworking plants). The equipment division has been organized into a separate corporation.

Firms Shift Operations

Smith-Corona Marchant Inc., Syracuse, N. Y., will transfer operations

(*Please turn to Page* 114)

Bethlehem Plans to Hike Ingot Capacity at Sparrows Point 10%

BETHLEHEM Steel Co. plans to add 800,000 tons to the rated ingot capacity of its Sparrows Point, Md., plant. Current capacity: 8.2 million tons.

How most of the increase will be provided: The seven furnaces in the No. 4 Open Hearth Shop will be adapted for the use of oxygen. An oxygen plant, with facilities to supply nitrogen, will be installed.

Other projects planned or in the works: Rebuilding a coke oven battery, increasing iron ore sintering capacity, adding three soaking pits, and revamping the flange mill.

The 60 in. universal mill will be rebuilt, a slab preparation yard constructed, a hot leveler added, and changes made in mill roller lines.

Changes in the 56 in. hot strip mill will increase output by almost a half-million tons per year. A roughing mill will be added and other roughing stands replaced. Three new furnaces and three new coilers will replace similar facilities at the plant.

Continuous annealing of steel strip will be increased 50 per cent. A high speed line to process the strip at speeds up to 2000 fpm will be installed.

New wire machines and auxiliaries at the wire mill will provide an additional 3000 tons of light gage wire capacity per month. High speed electrogalvanizing units will be added to increase production of Bethanized wire.

GRANODRAW SS Lubricant Base 300%, Cuts Heating Costs

Amchem Process Protects and Improves Surface Finish of Stainless Tubing

A 4000-gallon Granodraw SS operation is saving time and equipment, cutting costs and improving quality of stainless stock prior to drawing and reducing at Wallingford Steel—one of the world's largest producers of welded stainless steel tubing. In addition, Amchem Serseal chemical blanket has lowered heat costs, improved working conditions around the bath.

PRODUCTION TIME SAVED

Providing an excellent lubricant base, Granodraw SS has achieved an increase of 300 percent in drawing speeds at Wallingford's stainless tube reducing mill. Easily maintained and extremely stable, the Granodraw SS bath is left standing over a weekend, yet starts immediately in trouble-free operation for Monday morning operations!

VALUABLE EQUIPMENT PROTECTED

By preventing galling and seizing, and metal to metal contact between work and the dies, die life has been significantly increased. Drawing loads are between 20 and 25 percent less since use of Granodraw SS was instituted.

HEATING COSTS REDUCED

In conjunction with Granodraw SS, the Serseal chemical blanket for drawing operations has racked up additional savings in heat—up to 80 percent!—for Wallingford. With the bath effectively contained by Serseal, working hazards are reduced, corrosive effects are lessened on surrounding equipment—yet efficiency of the oxalate bath is not affected.

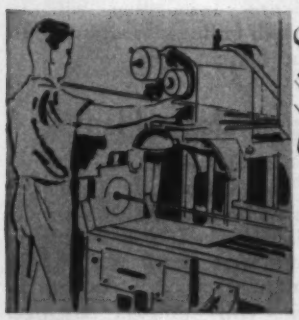
SURFACE FINISH IMPROVED

The Granodraw SS oxalate coating reacts with the metal surface, leaving a hard, spongelike deposit to which lubricants readily cling. As the stainless passes through the die, the lubricant melts and recrystallizes absolutely evenly —a sure sign of uniform, friction-free lubricating action and improved surface finish quality.

If your operations involve stainless tubes or wire drawing, cold heading or impact extrusion—find out how Granodraw SS can save you time, equipment and money while boosting product quality!

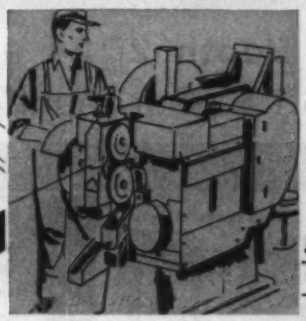
Increases Drawing Speeds and Rejects at Wallingford Steel!

Stainless tubing prior to immersion in Granodraw SS bath at Wallingford Steel. Note absence of steam vapors and fumes, overall cleanliness of operation obtained by use of Amchem Serseal, new heat-reducing chemical blanket.

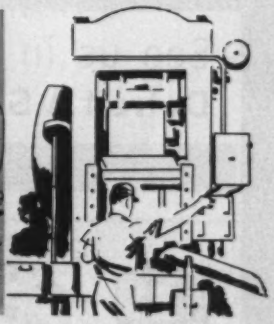


TUBE DRAWING

WIRE DRAWING



COLD HEADING



IMPACT EXTRUSION

Write for your copy of Bulletin 1437 on Granodraw processes, and further information on Serseal—two of the many Amchem chemicals for the metalworking industry.

AMCHEM

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Amchem, Granodraw and Serseal are registered trademarks of
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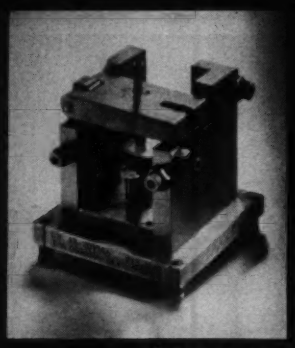
AMBLER, PA. • Detroit, Mich. • St. Joseph, Mo. • Niles, Calif.

Tooling with tape...



This drill jig: $280.00

This drill jig: $4.20

you can see the profit in point positioning with DIGIMATIC* model 202 Point-Positioning System

See us in **Booth 2024** at the **Detroit A.S.T.E.** Show, April 21-28

The lowest-cost complete point-positioning system for drilling, tapping, reaming, spot facing

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STROMBERG-CARLSON
A DIVISION OF **GENERAL DYNAMICS**
1489 N. GOODMAN STREET • ROCHESTER 3, NEW YORK

(*Concluded from Page* 111)

at Syracuse to its plants in Cortland and Groton, N. Y. The move will begin on May 1.

Simmons Co., New York, is closing its plant in Kenosha, Wis., about May 27. Operations are being transferred to Munster, Ind., where the company is building a plant addition. The facilities have been sold to the Kenosha Harbor Development Corp., which in turn leased space to American Motors Corp. The auto firm will use the space as a body plant.

Chemical Unit Expands

Pittsburgh Chemical Co., a subsidiary formed by Pittsburgh Coke & Chemical Co., Pittsburgh, plans to spend more than $4 million for construction of a new, 25 acre plant in Boyd County, Kentucky. The plant will be built along the Big Sandy River south of Catlettsburg. Scheduled for completion in 1961, it will produce coal derived activated carbon granules for purifying and decolorizing applications.

Woodward Reveals Plans

Woodward Iron Co., Woodward, Ala., plans to spend $2 million for improvements in 1960 (equal to that spent in 1959). The company has purchased machinery and equipment for an ore sintering plant and a turbo-blower for blast furnace operations. Installation will be paced with business conditions during the current year.

Pullman Closes Plant

Pullman-Standard Div. of Pullman Corp., Chicago, is offering for sale its Worcester, Mass., passenger car plant. The 600,000 sq ft of buildings were purchased in 1946 and modernized at a cost of $2 million. Only railroad passenger cars have been built in the plant in recent years.

ASSOCIATIONS

National Screw Machine Products Association, Cleveland, elected these officers: President, Charles L. Kerr, Kerr-Lakeside Industries Inc., Cleve-

Now available from your P-K® distributor...

PARKER-KALON SOCKET SCREWS

the most complete line in the industry

WITH LONG-LOK® INSERTS!

When design and production specify socket screws with self-locking inserts...ask your distributor to show you the Parker-Kalon line with the new Long-Lok feature.

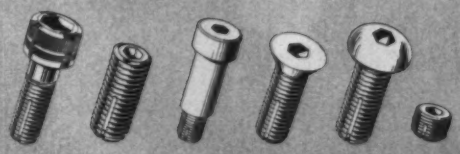
P-K socket screws with Long-Lok inserts of Polycap, a nylon type polymer, completely eliminate the need for lock washers or intricate safety wiring. They are ideal for use where frequent adjustment is a requirement . . . for thread-sealing applications...for extra holding power, even when subjected to severe vibration.

- Excellent performance over a wide range of temperature.
- No reduction in basic rated strength of the fastener.
- Meets requirements of MIL F 18240A (ASG) and NAS 1081 specifications.

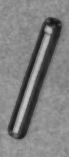
to fill all your requirements . . .

call on your Parker-Kalon distributor for P-K socket screws with or without the Long-Lok insert. You can order either way and get speedy delivery of P-K quality-controlled socket head cap screws (1960 and 1936 series), set screws (including P-K's new W-Point*†), shoulder screws, flat heads, button heads and pipe plugs.

ASK YOUR P-K DISTRIBUTOR FOR SAMPLES AND TECHNICAL BULLETIN NO. 862



LOOK TO P-K for all your socket screw, dowel pin and hex key requirements. Ask your distributor to show you the five new Hex Key sets, now available from P-K in addition to the popular #45 and #111 sets.



*T.M. †U.S. Patent No. 2,907,245

PARKER-KALON® *the complete line*

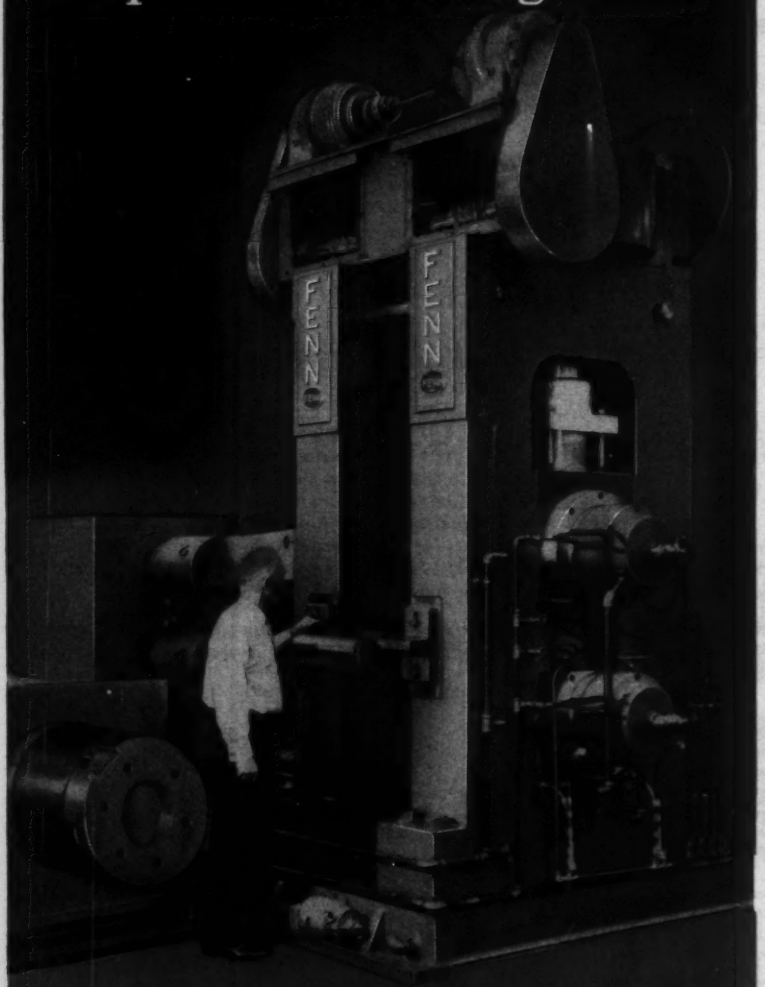
PARKER-KALON, a division of GENERAL AMERICAN TRANSPORTATION CORPORATION, Clifton, N.J., sold exclusively through Industrial Distributors.

With the big ones, too

FENN

Sets the Pace

in precision rolling mills



The inherent design of Fenn Rolling Mills achieves greater flexibility . . . extremely high separating forces . . . with dependability that only building to the highest quality standards can provide. Typical is the large heavy duty Fenn Precision Rolling Mill illustrated above. A combination Two-High/Four-High mill, with 16½" diameter rolls, it offers extreme versatility in rolling new alloys with high tensile strengths and is adaptable to either hot or cold rolling.

FENN MANUFACTURING COMPANY • 902 Fenn Road • Newington, Conn.

land; vice president, Harry G. Smith, Curtis Screw Co., Buffalo; treasurer, Roland G. Herker, Herker Screw Products Inc., Milwaukee; counsel and executive vice president, Orrin B. Werntz; secretary, Margaret S. Ballinger.

Robert H. Wasz, Joseph T. Ryerson & Co., San Francisco, has been elected president of the **Northern California Chapter** of the **Steel Service Institute.**

Detroit Powder Metallurgy Society elected to join the **American Powder Metallurgy Institute,** New York, as a local section. The new section represents about 100 members. Another section was formed in Chicago.

American Society of Tool & Manufacturing Engineers, Detroit, has approved the formation of a chapter in Manila, Philippine Islands, and accepted an application for one in Mexico City, Mexico.

Electronic Industries Association, Washington, has organized a Microminiature Electronic Committee to act as liaison for computer systems manufacturers and component manufacturers, exchanging information on component requirements.

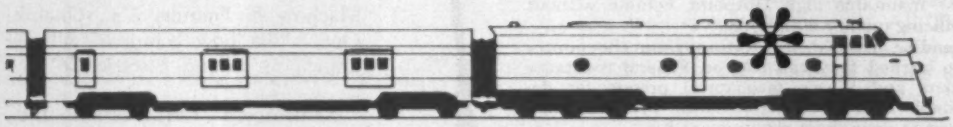
National Constructors Association has moved its headquarters from New York to Continental Bldg., 1012 14th St. N.W., Washington, D. C.

CONSOLIDATIONS

McCormick Steel Co., Houston, and **Ducommun Metals & Supply Co.,** Los Angeles, have authorized their managements to discuss the possibility of combining the two firms. Any such agreement is subject to McCormick stockholder approval.

The complete assets and business of **Skidmore Gear Co.,** Cleveland, have been acquired by a new corporation of the same name. New officers: Fred E. Harrell, chairman and treasurer; Philip C. Hungerford,

The Park Forging* that works as hard as this one has got to be good!



Better than 60% of all the diesel locomotives in the world are equipped with Park die-forged crankshafts.

It will pay you to find out how and why a Park Preferred Forging can exceed the usual.

Call us for some interesting and important answers.

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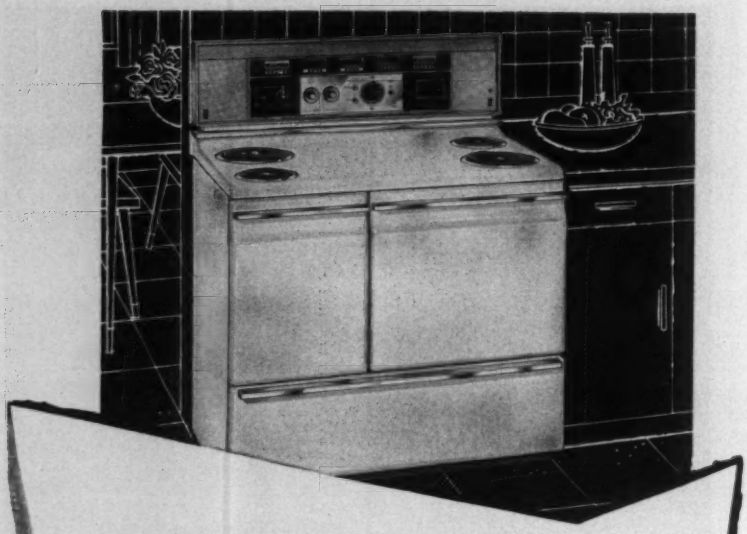


Hotpoint relies on . . .

FEDERAL-WARCO

Federal Multi-gun, combination spot and projection welders are a vital link in the exacting production schedules of Hotpoint ranges. The Federal unit shown below welds and forms range frames—adjusts to accommodate five cabinet sizes—maintains high Hotpoint volume without sacrificing quality standards.

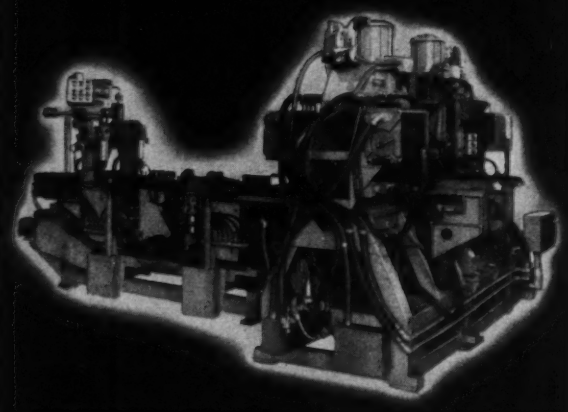
Leading metal fabricators throughout the country have learned they can rely on Federal resistance welders and Warco mechanical presses for dependable high speed performance. Precision engineered to your exact requirement by

THE FEDERAL MACHINE AND WELDER COMPANY
Warren, Ohio

Federal® WELDERS

Warco® PRESSES

Federal Multi-gun, Combination Spot and Projection Welder #58W3096A-B.



president and secretary; John C. Miller, vice president.

Budd Co., Philadelphia, has acquired the assets of **Metrol Inc.**, Pasadena, Calif. Metrol will operate as a department of Budd's Instruments Div. The department produces nondestructive testing equipment.

Clevite Corp., Cleveland, purchased **Schockley Transistor Corp.**, Palo Alto, Calif. The organization will become part of the Clevite Transistor Div.

Conveyor Systems Inc., Morton Grove, Ill., purchased **Farquhar Div.** of **Oliver Corp.**, York, Pa. Preengineered conveyors for commercial, industrial and bulk handling fields are manufactured at the acquired facility.

American Hoist & Derrick Co., St. Paul, acquired **Industrial Brownhoist Corp.**, Bay City, Mich., by purchase of the outstanding stock of the firm.

A Canadian group purchased the **Electric Motor Div.** of **American Machine & Foundry Co.**, Guelph, Ont. The new company will be known as **Leland Electric Co.**

Kent-Moore Organization Inc., Warren, Mich., purchased **Pyles Industries Inc.**, Detroit, manufacturer of systems for pumping and applying sealers, coatings, adhesives, paints, epoxies, foams, and other catalyzed materials. Carl B. Penn was appointed vice president and general manager.

NEW PLANTS

Linde Co., a division of Union Carbide Corp., New York, will build a flame process plant at North Haven, Conn. Ground will be broken in May and completion is scheduled for December.

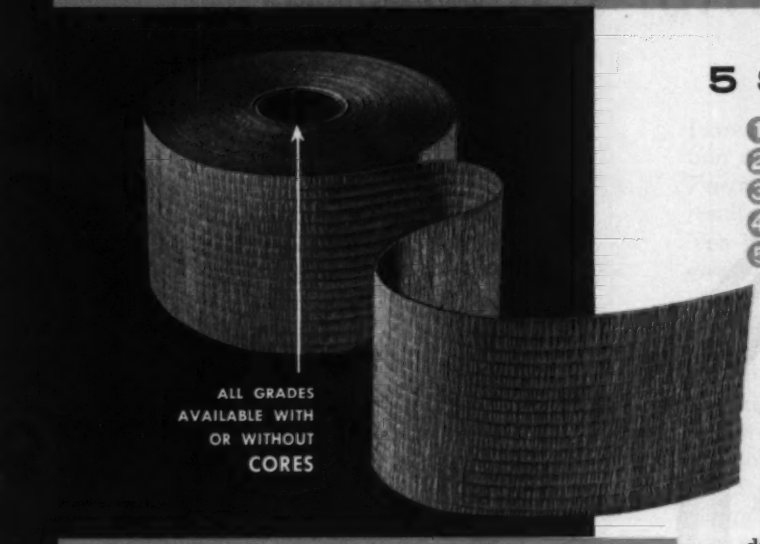
British Titanium Products Ltd. plans to build a $15 million plant near Sorel, Que., to produce titanium oxide pigments.

MacDermid Inc., Waterbury, Conn., is expanding its research and

(*Please turn to Page* 122)

Thilco Protective COIL WRAPS

For Automatic Machine Wrapping of Steel Strapping • Steel, Copper and Alloy Wires • Aluminum Wire and Extrusions • Plastic and Rubber Hose... *and other products*



5 STANDARD GRADES

1. ASPHALT LAMINATED
2. ASPHALT LAMINATED — REINFORCED
3. BLOND LAMINATED — (Non-Staining)
4. BLOND LAMINATED — REINFORCED
5. CREPED KRAFT (Plus Custom Grades)

Featuring Thilco's NEW LONGITUDINAL PLEATING

New, exclusive Thilco LP (Longitudinal Pleating) provides two-way stretch, adds approximately 20% more lineal foot yield to Standard creped grades. This added footage per roll increases machine coil wrapping efficiency by 20% — cuts downtime by reducing the number of roll change-overs, and saves another 20% on storage space. LP increases wrapper flexibility and is especially advantageous for packaging small circumference coils. All Thilco Coil Wraps are available *with* or *without* pleating in standard widths 3" to 5½" or in special widths to order. All can also be trade-mark Print Decorated. Write for details.

NEW CREPED WEIGHTS

Now available in basis weights up to 80 lb./50 lb./60 lb. laminated (50% heavier than previous available weights) or 90 lb. Single-Ply, creped up to 50% stretch.

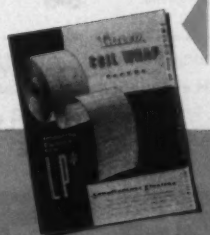
NEW PALLET LOAD "PUT-UP"

Saves Handling Costs — Increases Efficiency by 20%

Thilco Coil Wraps are compactly stacked on pallets, spindled on dowels at corners, interleaved with Thilco heavy-duty Kraft at 4-roll layer intervals to reduce shifting, then wrapped with an abrasion resistant, water-proof Thilco WRAP-DRI paper blanket which produces a sturdy, weather-resistant packaged unit. This new "pallet packing" method reduces handling costs, saves approximately 20% on storage space, provides immediate on-sight inventory and increases efficiency generally. There are many other advantages you'll want to learn about.

THILCO PAPERS INCLUDE:

- **WRAP-DRI** Waterproof protective papers
- **THILCO-TUF** Stainproof laminated papers
- **VAPOTITE** moisture-vapor barrier papers
- **POLY-COATED** and special treated papers
- **MG and MF** natural and colored krafts
- **GLASSINE** and greaseproof papers
- **SPECIAL BAGS** and case liners

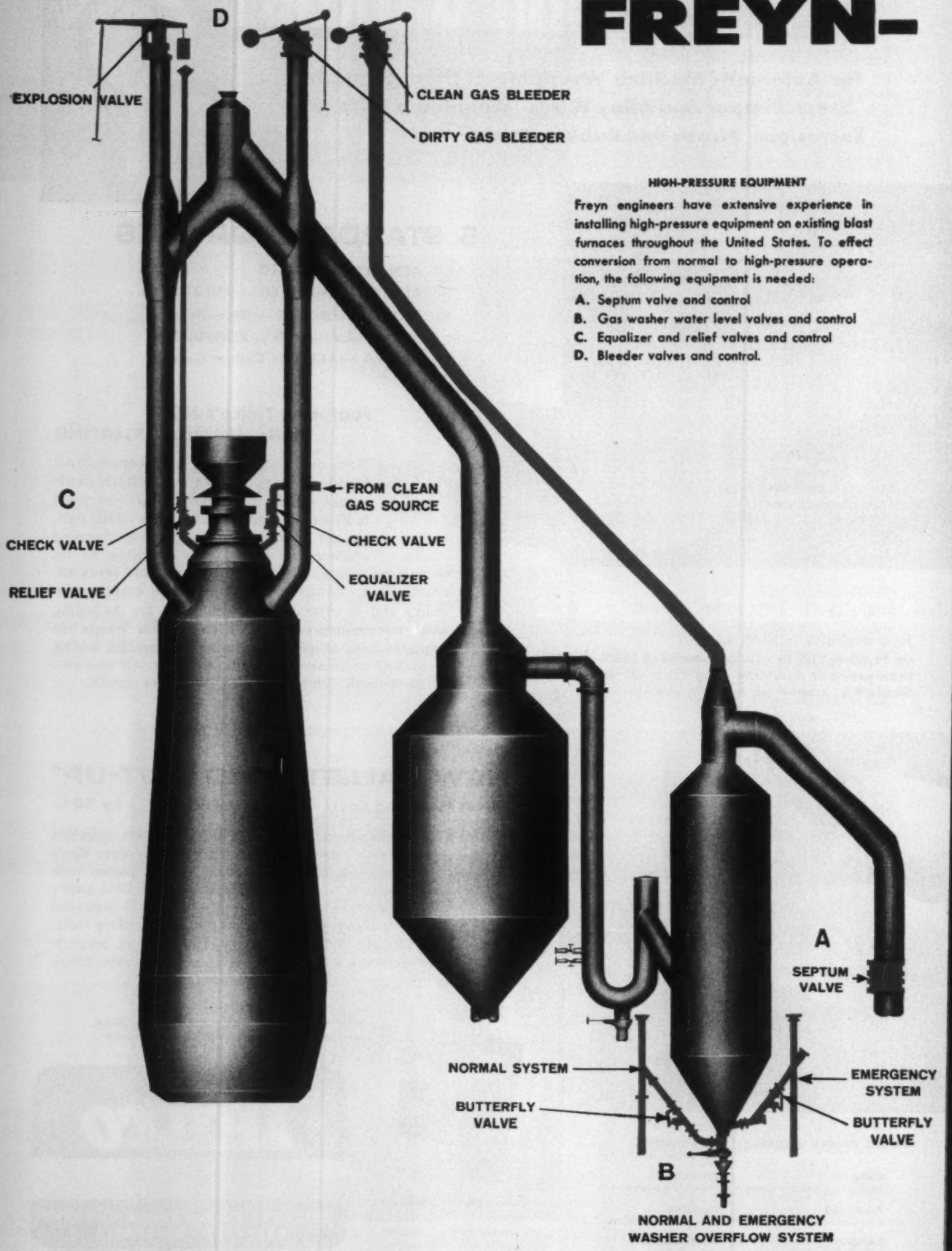


Write for Thilco Brochure containing Coil Wrap Samples and complete descriptive information.

NEW YORK • CHICAGO
DETROIT • CLEVELAND
KANSAS CITY • BOSTON
CINCINNATI • CHARLOTTE

THILCO
Functional Papers
THILMANY PULP & PAPER COMPANY
KAUKAUNA • WISCONSIN

FREYN-



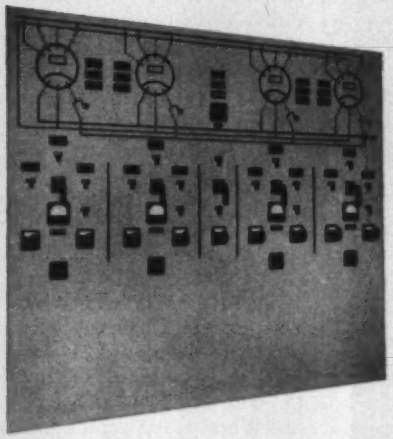
HIGH-PRESSURE EQUIPMENT

Freyn engineers have extensive experience in installing high-pressure equipment on existing blast furnaces throughout the United States. To effect conversion from normal to high-pressure operation, the following equipment is needed:

A. Septum valve and control
B. Gas washer water level valves and control
C. Equalizer and relief valves and control
D. Bleeder valves and control.

DESIGN EQUIPMENT

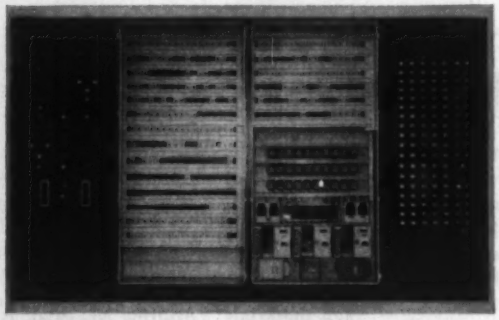
helps set new standards for blast furnace output



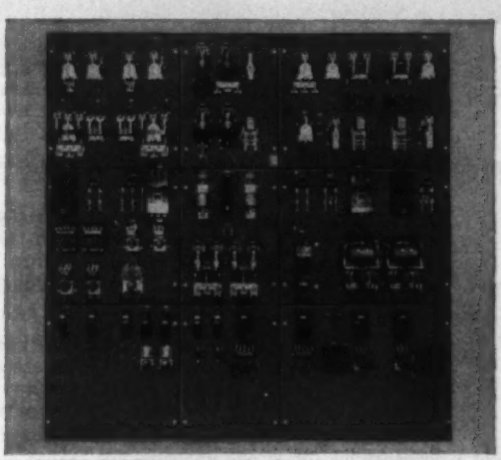
SYNOPTIC PANEL. Developed for use with completely automatic, electrically operated stove changing equipment, this master control panel is currently being installed in a large Northeastern plant. At a glance, the stove tender can quickly tell whether a stove is "on gas," "on blast," or "bottled up." Panel shows complete blast furnace piping arrangement, and is a graphic representation of the exact condition of the valves on each stove. Characteristic colors are used: Brown—stack gas; Blue—cold blast; Orange-Red—hot blast; and Yellow—gas. By pre-setting a selector switch, the stoves will be automatically changed in response to either time or temperature, without any attention from the stove tender. Provision is also made to take any one stove out of service and remain on a completely automatic sequence. Time loss in stove changing is greatly reduced.

In over 40 years as a leader in the design and construction of a complete line of blast furnace equipment, Freyn has pioneered many developments which have resulted in increased efficiency and greater output. You benefit from this unique combination of experience and service, because you know Freyn equipment can be depended upon to give you unequalled performance—with minimum maintenance and a high degree of operating economy.

In the areas of completely automatic stove changing and high-pressure furnace operations, the equipment shown here is typical of the advances in blast furnace technology constantly being sought by forward thinking Freyn engineers. For information on how Freyn equipment might improve *your* operations, write: **Freyn Department, Koppers Company, Inc., Pittsburgh 19, Pa.**



STATIC SWITCHING PANEL replaces relay sequencing control in many new and rebuilt installations. This type of control is completely static, without any interposing relays. Maintenance normally connected with relay contacts, coils and moving parts is eliminated in static switching.



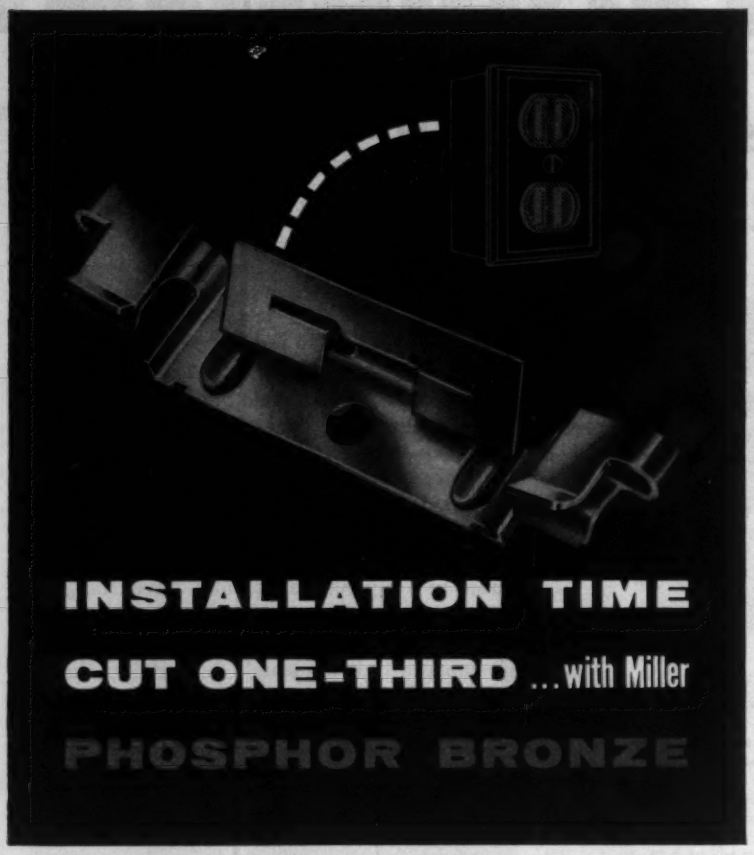
MAGNETIC PANEL is required for final power output to amplify signals from static switching panel. These signals actuate the distributor motors, stockline recorder motors, and the breeze belt and vibrating screen motors. Magnetic amplifiers are utilized for control devices as solenoid valves.

Changing Control • Skip Hoist • Pneumatic Bell Hoist • Stockline Recorder • Automatic Stove Changing Equipment • Motor Drive Snort Valve Operator • Pneumatic Sludge Ejector • High Pressure Equipment • Stove Burners • Stove Valves.

KOPPERS

KOPPERS

FREYN DEPARTMENT



*A designer for a leading electrical wiring device manufacturer hit upon a new design for a contact used in wall receptacles: eliminate the tie-down screws for incoming wire. Result—up to 30% saving in installation time . . . if a metal possessing the necessary properties could be found for the part.

The design called for a metal exerting just enough tension to lock the wire in place when inserted, keeping it from pulling out during installation and use. The headaches began when alloy after alloy fractured in forming the intricate part.

Then Miller entered the picture. Working closely with the manufacturer, Miller specialists were able to develop and supply a phosphor bronze alloy that entirely licked the fracture problem—and exhibited sufficient pressure to ensure good conductivity throughout a lifetime of service.

If savings in assembly and installation time, eliminating reject problems and cost-cutting from mill to finished part have a place in your operation, find out how Miller's experience in custom-tailoring phosphor bronze can save you time and money. *Name and case history on request.

miller SINCE 1904

ROLLING MILL DIVISION
THE MILLER COMPANY
MERIDEN, CONN.

...WHERE PHOSPHOR BRONZE IS THE MAIN LINE—NOT A SIDELINE

(*Concluded from Page* 118)

development laboratory. The 7000 sq ft addition will provide space for research in chromate conversion coatings, copper plating process, cleaners, and other metal finishing compounds.

Cutler-Hammer Inc., Milwaukee, plans to build a plant at Belmont, Calif., to house manufacturing, sales office, and warehouse activities. Motor control and power distribution equipment will be produced.

NEW OFFICES

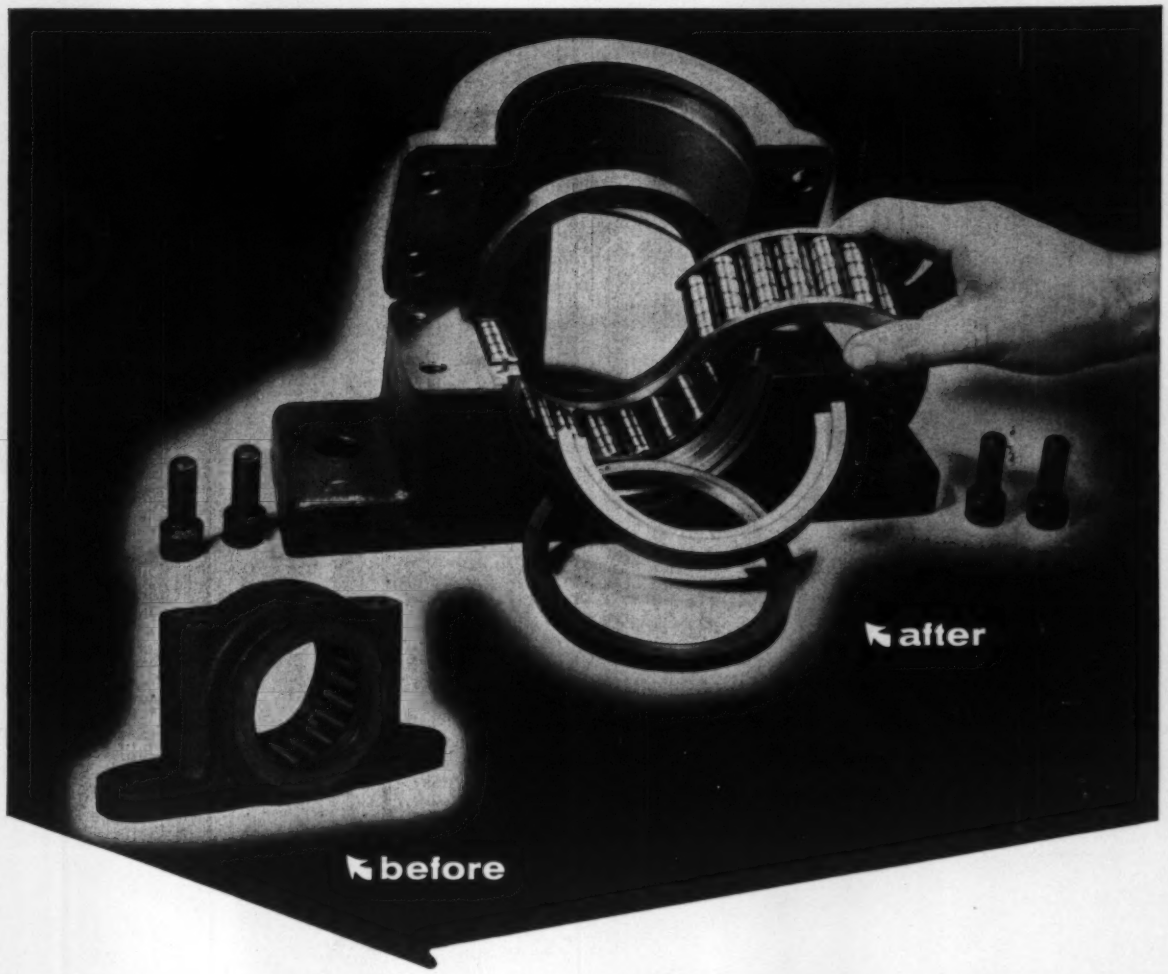
Simonds Worden White Co., Dayton, Ohio, opened sales offices in 14885 Meyers Rd., Detroit. The 2500 sq ft building contains offices for both the Dayton Safety Grinding Wheel and Machine Knife Divs.

Kaiser Aluminum & Chemical Corp., Oakland, Calif., is opening an aluminum products service center at 75 Public Square Bldg., Cleveland. A second center will follow in Kansas City. The centers will serve as educational meeting places for builders, home buyers, and manufacturers of aluminum building products.

Cincinnati Sub Zero Products has established separate offices at 224 E. Eighth St., Cincinnati, to handle sales and export operations. H. C. Schurgast is export manager.

L. B. Foster Co., Pittsburgh, established an office, yard, and warehouse at 4050 W. 119th St., Cleveland, Ohio. Stocks include pipe, steel sheet piling, and railroad trackage materials. Andrew M. Filak is manager.

Kaiser Refractories & Chemical Div., Kaiser Aluminum & Chemical Corp., has consolidated its Export Sales Dept. with headquarters offices in the Kaiser Center Bldg., Oakland, Calif. The department will handle sales, promotion, and marketing in connection with overseas refractories shipments. The consolidation followed the recent merger between the division and Mexico Refractories Co., Mexico, Mo.



Here's a "before" and "after" bearing problem solved by Bearings, Inc.

A large steel mill customer has six cranes with bridge line shafts equipped with the solid housing pillow blocks shown in the "before" photograph. Whenever one of the line shaft bearings needed to be replaced, the entire section of shaft had to be removed. Maintenance costs and crane downtime were excessive and costly. Our engineers were asked for a solution.

THE PROBLEM: Due to the extremely low base to center of shaft dimension of the original bearing, a conventional split housing, split roller bearing pillow block could not be used.

THE ANSWER: We designed and furnished a special split housing pillow block (see "after" photo) incorporating split bearings and split seals which maintain the original dimensions. These can be installed or replaced on the crane in a fraction of the time formerly required just to dismantle the line shaft.

This is just one of many successful solutions of a tough bearing problem. We can help you solve your bearing problems and supply replacement bearings from the stock carrying branch near you. We're authorized distributors for all nationally known bearings. Call us!

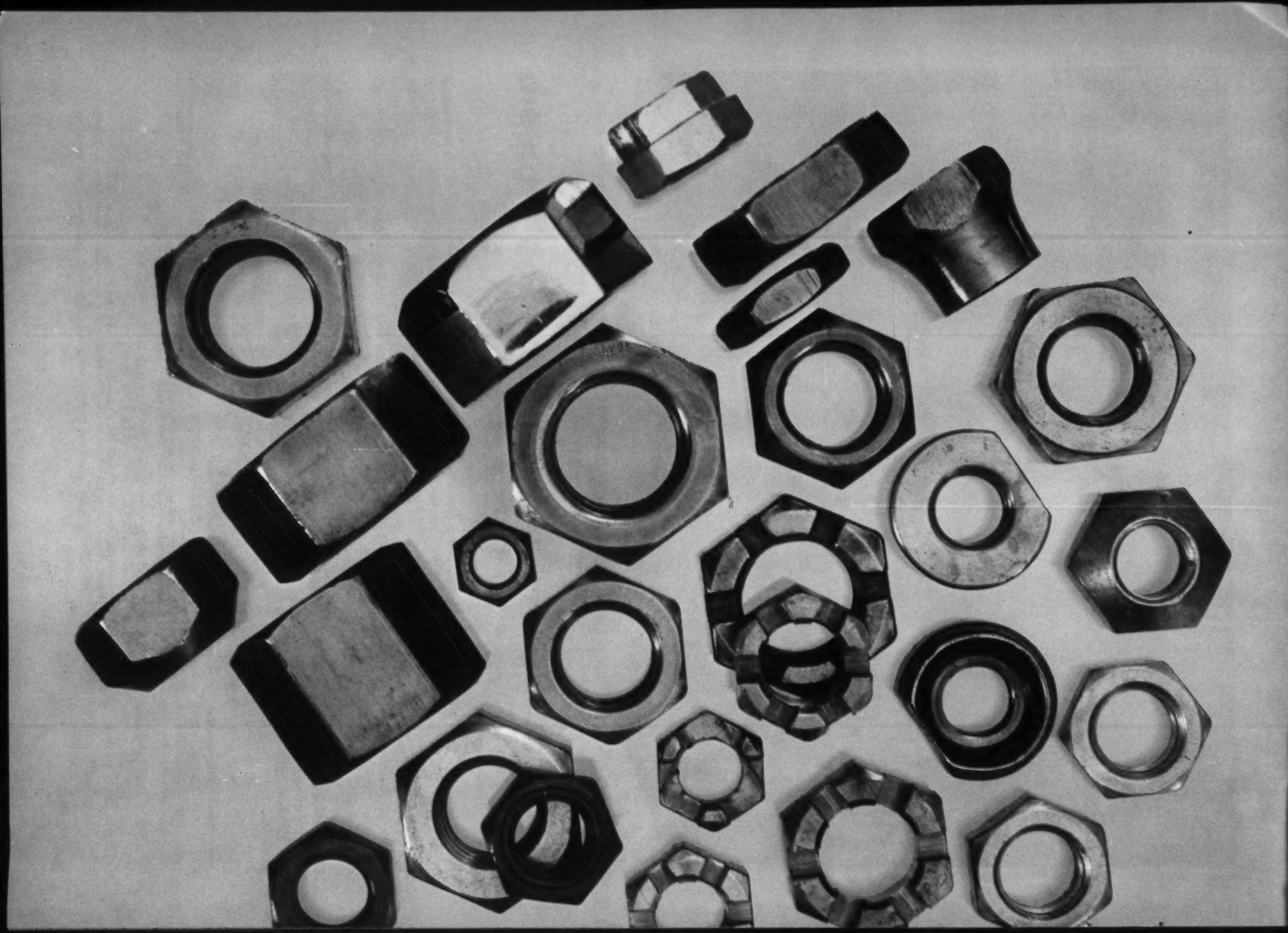
Providing bearing service in the North → **BEARINGS, INC.**

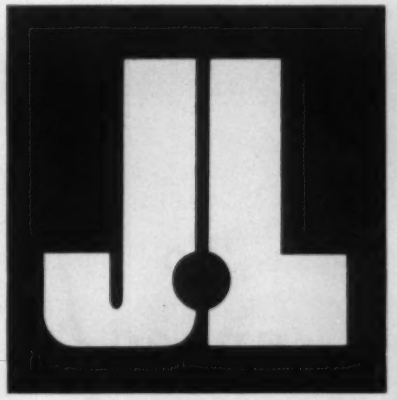
OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Painesville • Toledo • Youngstown Zanesville • **INDIANA:** Ft. Wayne • Indianapolis • Muncie • Terre Haute • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York **WEST VIRGINIA:** Charleston • Huntington • Parkersburg • Wheeling • **NEW JERSEY:** Camden • Newark **NEW YORK:** Balanrol Corp., Buffalo • Niagara Falls • **MARYLAND:** Baltimore • **DELAWARE:** Wilmington

and

in the South → **DIXIE BEARINGS, INC.**

FLORIDA: Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge • New Orleans **N. CAROLINA:** Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSEE:** Chattanooga • Kingsport • Knoxville • Nashville **VIRGINIA:** Norfolk • Richmond





Pittsburgh Works bar mill—where scrapless nut quality hot rolled steel bars are tailor-made for any nut application.

We may not know your production equipment
We may not know your product application
We may not know anything about your specific requirements

. . . but we want to

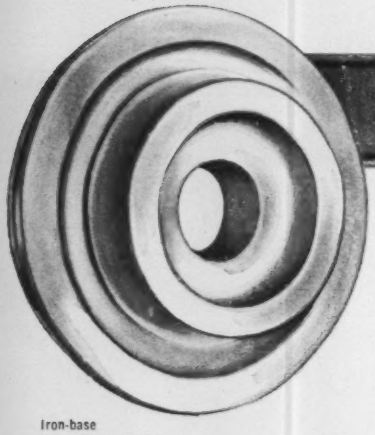
and, we do know all about scrapless nut quality hot rolled steel bars

and the techniques in metallurgy and in nut-forming that result in smoother production runs, fewer rejects and less waste. We know how to achieve the precise balance and uniformity in steel bars to provide you with the best combination of nut-forming properties. We can assure optimum metal flow characteristics and shear strength so that the steel will cold work easily and will not crack. We control steel to low rates of strain hardening so that large volumes of metal can be upset without annealing. Most important, we regard your nut-forming problems as our major challenge. . . .

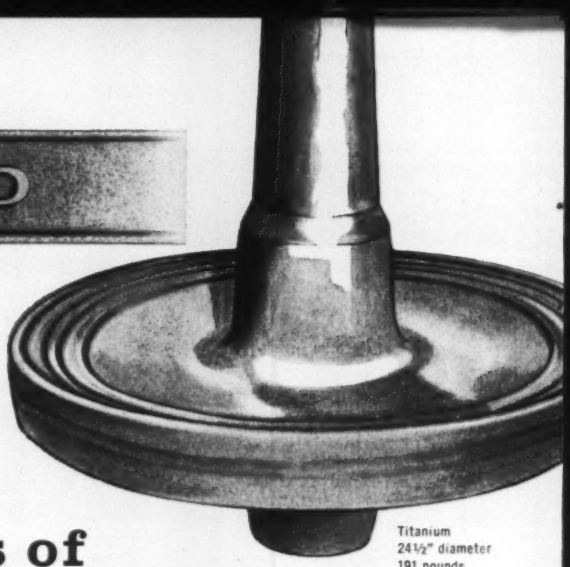
and when given an opportunity to talk to you about your specific operation, we'll know how to develop exactly the right steel to meet your needs. We invite your inquiry. Please write . . .

Jones & Laughlin Steel Corporation

3 GATEWAY CENTER
PITTSBURGH, PENNSYLVANIA



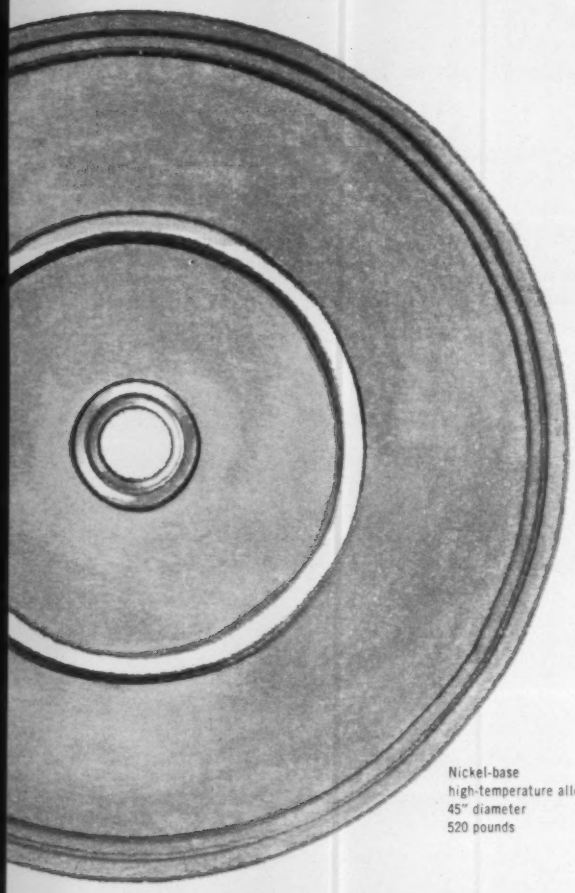
FORGED



Titanium
24½" diameter
191 pounds

Iron-base
high-temperature alloy
21½" diameter
244 pounds

To speed the progress of gas turbine development

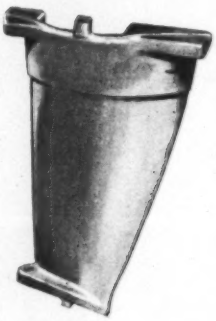


Nickel-base
high-temperature alloy
45" diameter
520 pounds

For applications ranging from automotive to aircraft propulsion, Wyman-Gordon is the world's largest producer of forged components for the gas turbine industry—turbine wheels, compressor discs, blades and vanes, for stationary turbines, nuclear installations, aircraft and missiles.

Wyman-Gordon's production experience includes forgings of a wide range of metals from low-alloy high-strength steels—titanium—intermediate temperature alloys—to the super-nickel-base alloys and refractory metals. *Guaranteed minimum properties* assure improved performance and dependability, and enable designers constantly to raise their sights and increase turbine capabilities.

With unexcelled research and production laboratories to concentrate on your development problems and with hammer and press capacity unequalled in the country, Wyman-Gordon is prepared to serve you in great depth at the design, engineering and purchasing stages of your requirements.



Titanium
15½" length

EST. 1883

High-strength steel
19" diameter
143 pounds

WYMAN-GORDON

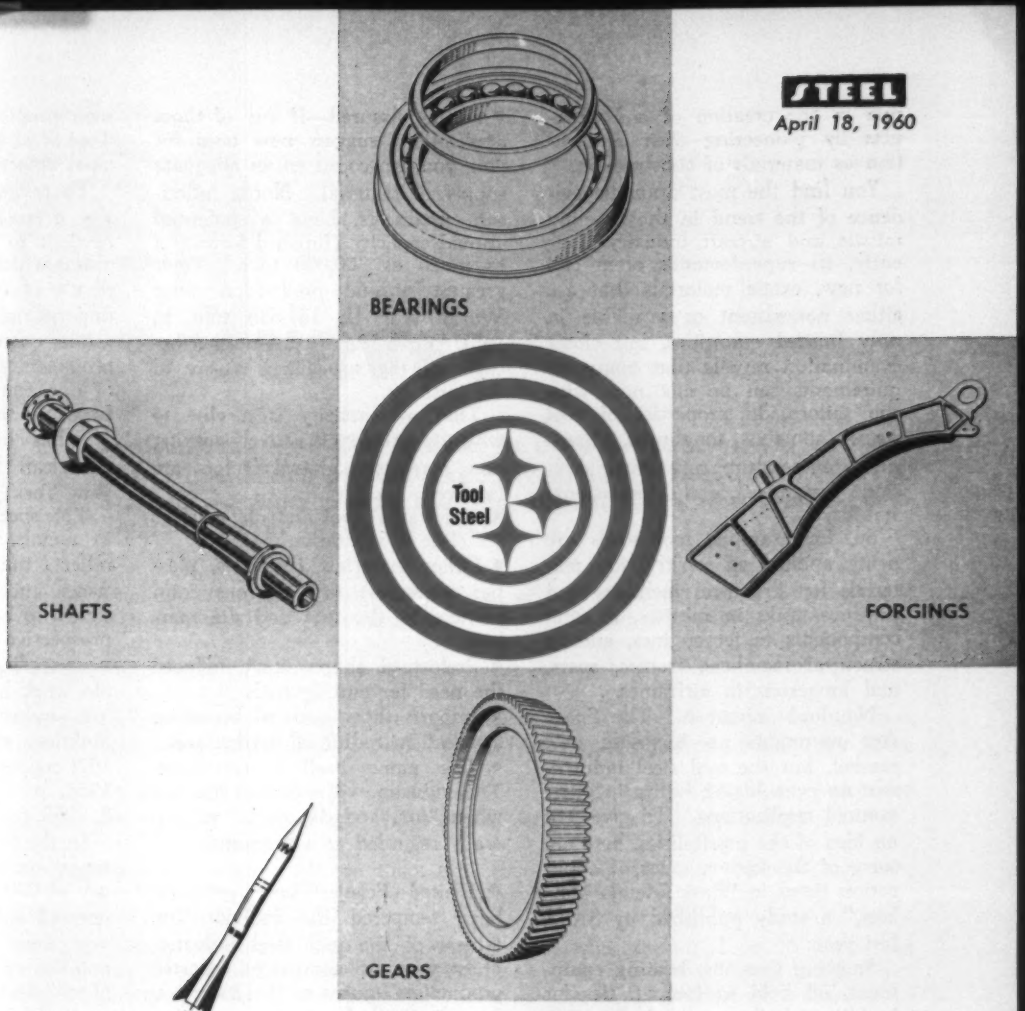
FORGINGS

of Aluminum Magnesium Steel Titanium . . . and Beryllium Molybdenum Columbium and other uncommon materials

HARVEY ILLINOIS — WORCESTER MASSACHUSETTS — DETROIT MICHIGAN

GRAFTON MASSACHUSETTS — FRANKLIN PARK ILLINOIS — LOS ANGELES CALIFORNIA — FORT WORTH TEXAS

STEEL
April 18, 1960



Tool Steelmakers Shoot for New Markets

The missile and components above suggest what they have in mind: Nontool applications. This special study, No. 4 in our series on Trends in Metals, suggests many new ways you can cash in on this material's unique set of properties

AN exciting new course for tool steels is being charted by metalworking managers and their suppliers. They're using ingenuity to extend the usefulness of materials that play an indispensable, and familiar,

role in the creation of end products by pioneering their application as materials of construction.

You find the most dramatic evidence of the trend in the exacting missile and aircraft industry. Patently, its superdemands often call for new, exotic materials that are either nonexistent or available in only limited quantities, but closer examination reveals that many requirements can be met now with the tailormade properties of tool steels—namely, toughness, hardness, temperature resistance, abrasion resistance, and dimensional stability.

So, for example, tool steels are being applied as construction materials for structural members and pressure tanks in missiles, as vital components in jet engines, and as structural members, frames, spars, and longerons in airframes.

No doubt about it. The Space Age represents an imposing new market, but the tool steel industry sees an even bigger future in other nontool applications. To give you an idea of the possibilities, here are some of the known areas of application listed in "Basic Metals Markets," a study published by STEEL last year:

Sporting firearms, heating equipment, oil field equipment, ties for buildings, boiler parts, boilers, reactors, turbines, generators, diesel engines, fuel plungers, sewing machines, poultry processing equipment, lithographic machinery, oil mills, cotton gins, roller chains, gears, clutches, labeling machinery, voting machinery, refrigerators.

• **Supply Assured**—If any of those applications suggest new ones for you, you can count on an adequate supply of material. North American producers have a potential annual capacity (finished forms) of as much as 300,000 tons. Their greatest annual production since World War II: 181,836 tons in 1951. Open capacity is needed because of the specialized nature of the business.

That overcapacity is a clue to why the industry is actively seeking new markets. Several factors are involved:

• Traditional tool and die markets are close to saturation.

• Other materials (carbides, plastics, ceramics) are vigorous competitors in the tool and die markets.

• Preformed shapes have reduced the need for cutting tools.

• Imports show signs of becoming a threat in traditional market areas.

• The name itself is restrictive. The industry will welcome the day when "tool and die steels" is generally regarded as a misnomer.

• **United Front**—Those problems have tempered the individualism typical of the tool steel industry. (Last year, 16 companies reported production figures to the American Iron & Steel Institute—see listing on this page.) Annual tonnage sold amounts to only one-tenth to one-fifth of 1 per cent of all steel distributed.

In 1958, tool steel producers formed a committee within the institute to tackle some of their common problems. The Committee of Tool Steel Producers has these principal objectives:

To review tool steel statistics to see if more or better ones are needed; to develop education programs which will promote the proper use of tool steels; and to study imports and tariffs.

The committee includes 13 U. S. producers, the Canadian subsidiary of one company, and a Canadian firm. Its secretary, Ernest J. Bolduc Jr., has his headquarters at the American Iron & Steel Institute, New York.

This special STEEL study of trends in metals, the fourth in a series, reflects the progressive thinking of users and producers. It is designed to help you, the present and prospective user, find profitable, new applications of tool steels, the old work horses of the metalworking industry. (Previous studies: Stainless steels, Nov. 4, 1957, p. 107; copper and its alloys, Oct. 27, 1958, p. 75; and aluminum, June 8, 1959, p. 103.)

In the following sections, we will report on trends revealed in a survey of 3000 users; discuss tool and nontool applications that may give you some ideas; offer you some pointers on how to choose the type of tool steel—carbon (water hardening), high speed, hot work, air hardening (chromium die), oil hardening, shock resisting, mold, or special purpose—that will give you the properties you seek; and cover some of the highlights and trends in the production of these tailormade materials.

Tool and die steel production is reported to the American Iron & Steel Institute by these producers:

Allegheny Ludlum Steel Corp.
Pittsburgh, Pa.

Atlas Steels Ltd.
Welland, Ont.

Bethlehem Steel Co.
Bethlehem, Pa.

Braeburn Alloy Steel Div.,
Continental Copper &
Steel Industries Inc.
Braeburn, Pa.

Carpenter Steel Co.
Reading, Pa.

Columbia Tool Steel Co.
Chicago Heights, Ill.

Crucible Steel Co. of America
Pittsburgh, Pa.

Firth Sterling Inc.
Pittsburgh, Pa.

Ingersoll Steel Div.,
Borg-Warner Corp.
Chicago, Ill.

Jessop Steel Co.
Washington, Pa.

Latrobe Steel Co.
Latrobe, Pa.

Simonds Saw & Steel Co.
Fitchburg, Mass.

Timken Roller Bearing Co.,
Steel & Tube Div.
Canton, Ohio

Universal-Cyclops Steel Corp.
Bridgeville, Pa.

Vanadium-Alloys Steel Canada Ltd.
London, Ont.

Vanadium-Alloys Steel Co.
Latrobe, Pa.

Vulcan-Kidd Steel Div.,
H. K. Porter Company Inc.
Aliquippa, Pa.

SURVEY

Look for tool and die steels to be used by more plants for more jobs. In a check of 3000 executives, STEEL found that 2 out of 3 metalworking plants use the steels. Here are trends, predictions, buyer attitudes, needs . . .

- Demand will shoot upward; 95 per cent of the buyers will use as much or more of the product five years from now as today; 58 per cent will use more.
- Most plants will buy more of the product this year than last.
- 98.5 per cent of the buyers use the steels for tooling purposes; 26 per cent mention other uses. Another 3 per cent plan nontooling applications within two years.
- 82 per cent of the buyers use the steels for dies; 73 per cent for cutting tools; 48 per cent for wear surfaces; 18 per cent list other tooling applications.
- More plants buy drill rod than any other form of tool and die steel; tool bits, hot rolled bars, and flat ground stock are the next most popular items.
- Foreign competitors are edging into the domestic market: 1 in 20 plants use foreign tool and die steels now. Of those, 5 in 7 say they'll buy more of the foreign product in the next two years. Of those not buying abroad now, 4.4 per cent plan to do so by 1962.
- Of the 1 in 3 plants not using tool and die steels now, 85 per cent say they never have. Of the 15 per cent who have discontinued using the product, nearly all have changed their product lines, closed their machine shops, or subcontracted tool and diemaking.
- 7 per cent of the nonusers say they will start buying these steels in the next two years: 3 per cent this year and 4 per cent in 1961.
- 2 in 3 buyers want producers to eliminate tradenames and use standard numerical designations for each analysis.
- 93 per cent say their specifications are consistently met by suppliers.
- 95 per cent say it's easy to get all necessary technical information about the steels.
- Most feel venders do a good job, but they would like improved deliveries, a wider selection and better technical assistance.
- 1 in 5 users specifically lists a new or improved property he would like in the tool and die steels he buys. Most of the wants center on problems of heat treatment, shock resistance, machinability, and wear resistance. Most often mentioned: Better heat treating characteristics—more uniformity, less dimensional change, prevention of hard spots, less edge brittleness, freedom from warpage, prevention of inclusions and cracking, less decarburization. Other desired improvements: Better abrasion resistance, improved antigalling properties, a combination of better shock and wear resistance, better flame hardening materials for short run dies, superior fatigue resistance.

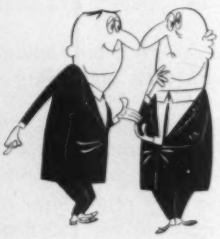
Expect 3 in 5 buyers of tool and die steels to expand their requirements in the next five years; 3 in 10 have or plan non-tooling applications

HOW THEY BUY

77%
TRADE-NAME

32%
AISI-SAE DESIGNATIONS

21%
SELLERS' SUGGESTIONS

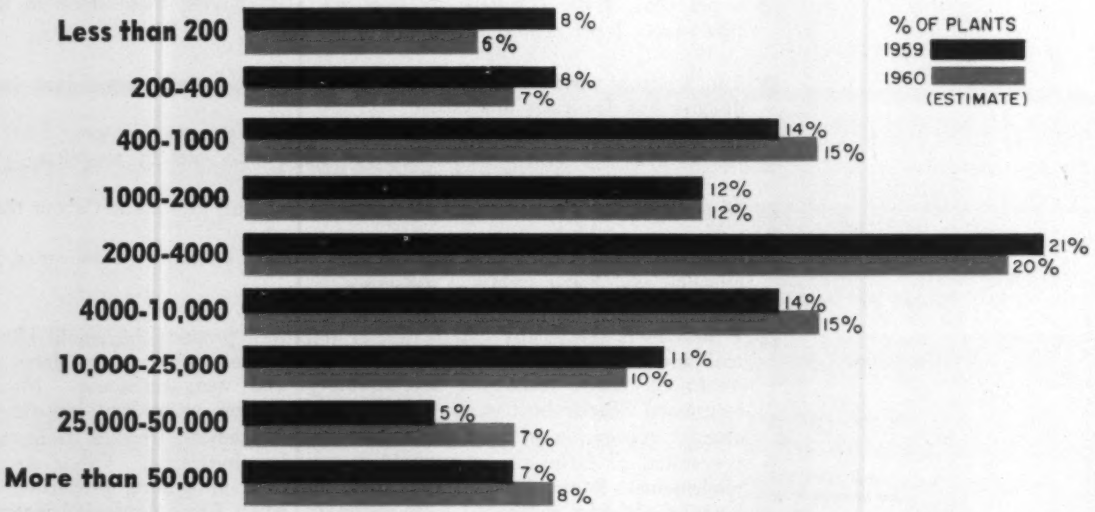


12%
OTHER METHODS

Some buyers use more than one method.

HOW MUCH THEY BUY

POUNDS (Annual consumption)



WHAT FORMS THEY BUY

Percentage of users whose annual purchases of each form fall into each of these quantity ranges . . .

	Total users	Less than 200 lb	200-399 lb	400-999 lb	1000-1999 lb	2000-3999 lb	4000-9999 lb	10,000 lb or more
Drill rod	**79%**	32	19	13	9	2	2	2
Tool bits	**75%**	47	13	7	5	1	2	*
Bars, hot rolled	**71%**	12	7	12	10	11	8	11
Ground flat	**65%**	31	13	10	8	2	1	*
Bars, cold finished	**52%**	12	8	9	6	5	7	5
Plates	**35%**	10	4	5	7	2	1	6
Sheets and strip	**24%**	9	3	2	2	3	2	3
Forgings	**21%**	6	2	3	2	3	2	3
Castings	**16%**	4	1	2	1	1	4	3
Wire	**14%**	8	2	1	*	*	*	2
Special shapes	**11%**	5	2	2	1	*	*	*
Extrusions	**7%**	2	1	1	1	*	*	1
Other forms	**8%**	2	1	*	2	1	1	1

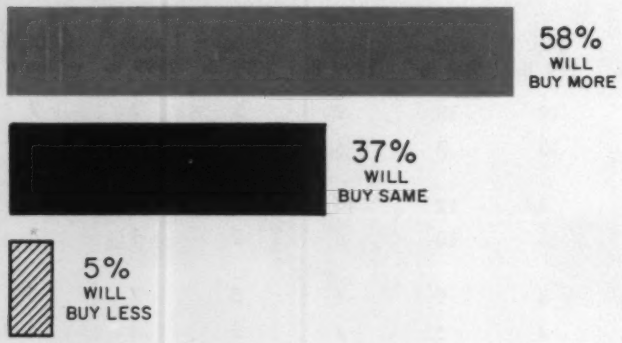
*Less than 1 per cent.
Of the respondents, 7 per cent buy only one form; 9 per cent buy two forms; 16 per cent buy three; 19 per cent buy four; 17 per cent buy five; 15 per cent buy six; 5 per cent buy seven; 6 per cent buy eight; 6 per cent buy 9 or more forms.

WHERE, HOW MUCH THEY BUY

Per cent of Users	Per cent of Requirements ▶	Less than 20%	20% 40%	40% 60%	60% 80%	80% 99%	100%
		(Per cent of users)					
21	**Buy direct from U. S. mills**	4	2	3	2	7	3
56	**Buy from mill owned service centers**	7	8	14	8	9	10
82	**Buy from independent distributors & service centers**	10	13	14	5	5	35
5	**Buy foreign products**	1	1	*	1	*	1

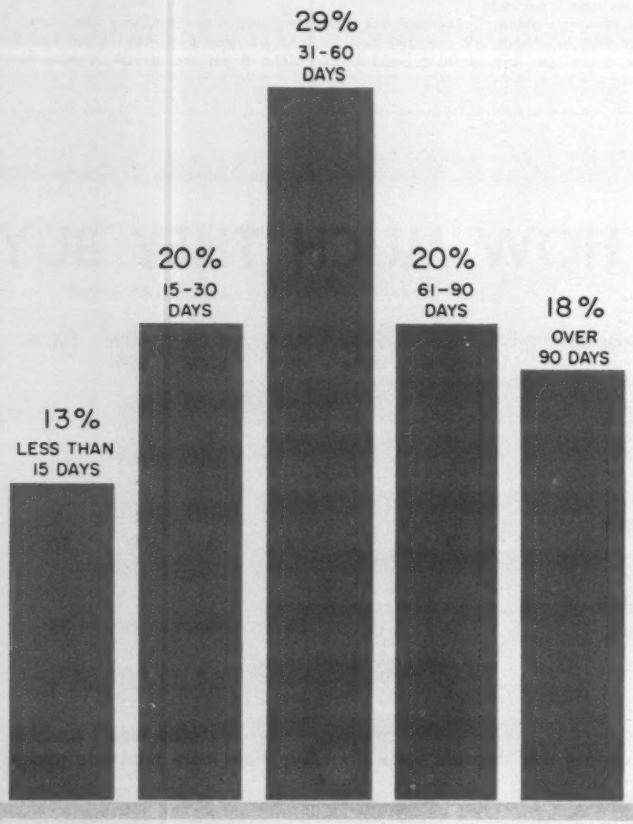
*Less than 1 per cent.
(Figures do not add because some firms buy from more than one source)

FIVE YEARS FROM NOW



19% will use 1-10% MORE 6% will use 21-30% MORE
26% will use 11-20% MORE 7% will use over 30% MORE

BUYERS' INVENTORY POLICIES



WHAT TYPES THEY BUY

Percentage of users who buy each of these types . . .

91% Oil hardening

74% High speed

55% Water hardening

44% Chromium die
(high carbon, high chromium; 5 per cent chromium; low temperature air hardening)

30% Shock resisting

22% Hot work

9% Mold

16% Special purpose

Of the respondents, 11 per cent use only one type; 22 per cent use two types; 27 per cent use three; 15 per cent use four; 14 per cent use five; 7 per cent use six; 4 per cent use seven or more types.

BUYERS' WANTS FROM VENDERS

56% want them to carry a wider range of shapes and sizes.

30% want improved deliveries.

22% want better technical assistance.

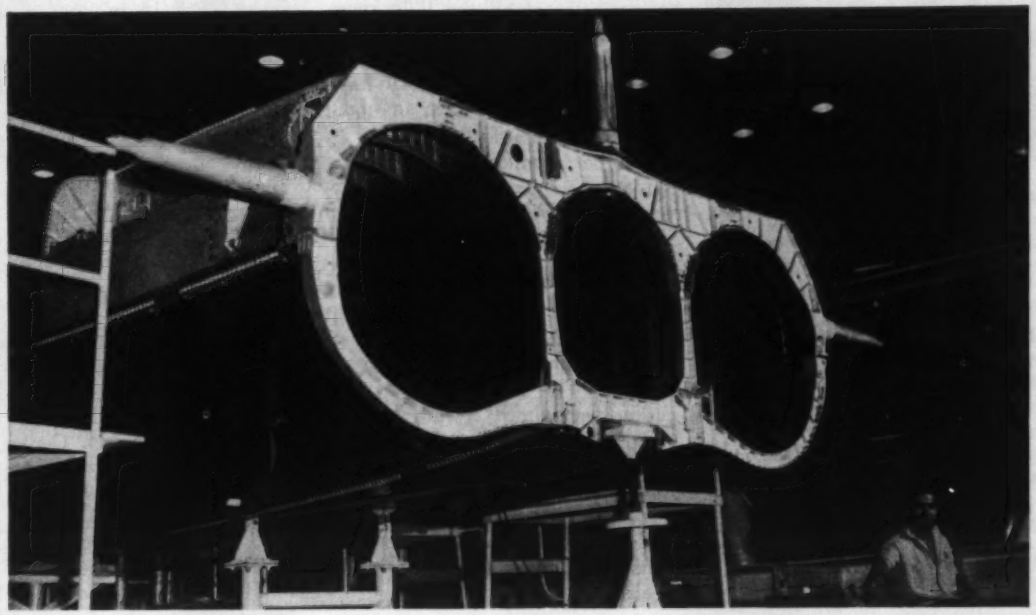
19% want better trained salesmen employed.

14% want closer tolerances.

14% want new uses pioneered.

7% want other services.

Tool Steel USES



All spars in this airframe structure are made from modified H-11, hot work tool steels (VascoJet 1000). Minimum strength is 280,000 psi. The section is for the A3J twin jet

SUPPOSE YOU need a construction material with:

290,000 psi tensile strength . . .

Or the ability to outwear your present material by five times . . .

Or a surface hardness in excess of 60 Rockwell C . . .

Or high hardness (or strength) at 700° F or higher . . .

Or strength, with minimum heat treat distortion . . .

Or impact strength (say a Charpy of more than 200 ft-lb) for repeated blows.

Tool steels could be your easiest, least expensive solution in the long run.

Manufacturers faced with the necessity of putting premium properties into their products are uncovering applications which are giving tool steels a new life in new markets as big as tomorrow.

The accelerating trend toward nontool applications is top technological news, but such uses have plenty of precedent, even though the fact probably isn't widely known because the materials generally go into components and tend to lose their identity in the end product.

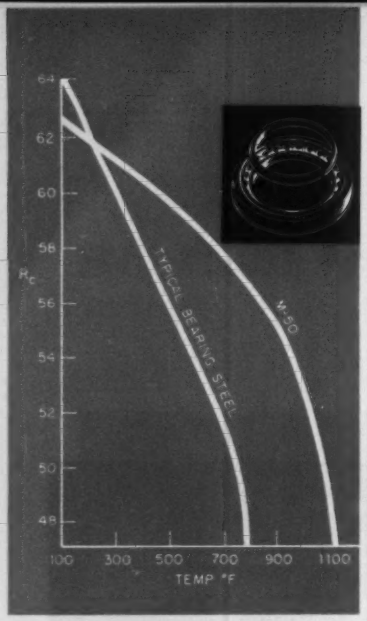
• **In the Home**—Established household applications include tool steel parts for sewing machines, compressors (in refrigerators and air conditioners), electric razors, hand and power tools.

• **In Industry**—For years, industrial designers have relied on tool steels to get quality performance from such diverse equipment as diesel engines, hydraulic systems, paper making, printing, mining, construction, and air driven machinery. As an example, the wear resistance and hardness of tool steels has made them naturals for machine ways, lead screws, and other heavy wear areas.

A recent application development at Jessop Steel Co., Washington, Pa.: The cladding of carbon steel plates with tool steel surfaces for chutes that must handle abrasive materials. The tool steel takes the wear, while the carbon steel provides a tough body that is easily fabricated.

The Trail Blazer

Probably the most spectacular leap from tooling to nontooling applications has been made by hot work die steels. Aircraft and missile makers use them because they



BEARING BEATS THE HEAT—General Electric Co. engineers use M-50 tool steel for this and other bearings and gears in advanced turbojet engines. This is the main thrust bearing of the J79 engine that powers the B-58 Hustler and the F-104 Starfighter.

The relatively new, high speed steel grade contains 0.80 C, 4.0 Cr, 4.0 Mo, 1.0 V. It's normally vacuum melted. Why GE selected the grade: The material won't soften at temperatures in excess of 700° F (see curves), and it has a low critical alloy content. Engineers report: Bearing life is up to five times longer

retain strength at temperatures up to 1200° F.

H-11 has done most of the job. The alloy has this nominal content: 0.35 C, 5.00 Cr, 0.40 V, 1.50 Mo. Modifications of the standard analysis normally lift the carbon slightly, and some have a lowered molybdenum content.

To give you an idea of how these steels are regarded in the aircraft and missile industries, listen to Wayne A. Reinsch, material and process engineer, North American Aviation Inc., Los Angeles. Here's what he told STEEL about one of the most advanced airplanes:

"Tool steels are important in the construction of the B-70 Valkyrie because service temperatures exceed 500° F. The H-11 type tool steel is used in the landing gear, in the internal fuselage structure, and for hydraulic barrels and pistons. This material is heat treated to a strength level of 280,000 to 300,000 psi, providing the highest strength-to-weight ratio of all the B-70 structural materials. Although some other alloy steels can be heat treated to the same strength level, H-11 retains its strength at about 500° F to a greater degree.

Another application: Robert L. Sproat, manager, research and development, Standard Pressed Steel Co., Jenkintown, Pa., tells STEEL: "We use H-11, 5 per cent chromium, hot work die steels for bolting applications. The parts are heat treated above 220,000 psi. The parts are stable and retain their strength up to 900° F. Our original investigation was aimed toward the development of high temperature bolts. However, it was found that the room temperature properties, especially fatigue, were superior to those obtained in high strength bolts fabricated from lower alloy steels."

Fabrication

Many of the parts produced from H-11 steels have been forgings.

Working the material into complex shapes calls for some special care. Generally, blanks are heated to about 2000° F before they are forged, and that level must be maintained as long as severe working is taking place. Good heating and handling techniques are musts.

At the North Grafton, Mass., Air Force plant, Wyman-Gordon Co. personnel are using a 50,000 ton, closed die forging press to produce customer designated H-11 parts that have shipping weights as high as 750 lb, says Carl Bergstrom, chief metallurgist. The parts run as large as 42 in. OD, with 39 in. ID. At the company's Worcester, Mass., plant, fittings and spindles of varying configuration are being forged by hammers in closed dies. One of the fittings, 2¾ by 33 in., has a shipping weight of 52.3 lb. One spindle, measuring 7 by 27 7/16 in., has a shipping weight of 268½ lb.

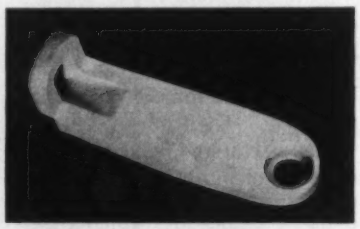
The forgings, says Wyman-Gordon, have resisted 1000° F heat without tempering. They are either hammer forged or press forged at temperatures of about 2200° F. A die stock with 390 Brinell hardness is used. Die life appears to be satisfactory, although not enough forgings have been completed to justify firm conclusions.

• **Other Processes** — Despite the prominence of forgings, other processes have been used in production. Metallurgists at American Brake Shoe Co.'s Research Center, Mahwah, N. J., report H-11 castings can be produced with at least a 260,000 psi tensile strength, a 205,000 psi yield strength, and an elongation of 9.5 per cent.

H-11 steels are being explosively formed by nearly all major airframe makers. The material is used for skins, bearings, valves, support brackets, and a host of other parts.

In the annealed condition, the hot work die steels are easily machined. After final heat treatment, machining is difficult. The machine tool and workpiece must be rigid. You can expect short tool life under any conditions, but the best recommendation seems to be: Use carbide tools at not more than 150 surface feet a minute and a

PRECISION CASTING fits tool steels into more applications. The range is wide; From heat resistant alloys in aircraft to high speed steel in hay balers. Here are examples of parts that must withstand severe service (source: Precision Metalsmiths Inc., Cleveland): 1. Guide for wire strapping in packaging machine. 2. Wire cutter knives. 3. Universal joint knuckle. 4. Shuttle lifter in weaving machine



1. D-2 steel

flood of coolant. Optimum procedure is to do all machining operations before final heat treatment.

With proper precautions, you can weld these steels. Parts should be preheated; a shielded arc should be used; and slow cooling is recommended.

• **Other Types Used** — H-11 has company in the trend toward tool steel structural jobs. For example, a publication, "Standard Designations of Alloys for Aircraft and Missiles," for the Defense Metals Information Center (compiled by Battelle Memorial Institute, Columbus, Ohio) lists these: H-11, H-12, H-13, H-14, H-15, H-16, H-20, H-21, H-22, H-23, H-24, H-25, H-26, H-41, H-42, H-43 (all hot work tool steels); S-1 (shock resisting); A-2, O-1 (cold work); M-2, T-2 (high speed); and P-20 (a special purpose tool steel).

Other tool steels are also going into those applications.

M-50, a new high speed grade, is the construction material for bearings and gears in the hot spots of one of today's mightiest jet engines. High speed steels offer superb wear resistance, and they are the only type having a higher general red hardness (resistance to elevated temperatures) than the hot work steels. As the red hardness limit is pushed up, engineers may begin to consider high speed steels for some of the jobs, even though a sacrifice in room temperature toughness may be necessary.

Some of the shock resisting grades are being considered where fatigue is critical, as in springs.

Metallurgy

To a large extent, hardenability and alloying elements will control your use of tool steels.

Grades that harden in oil or air usually are deep hardening. In many cases, there is little difference between the center and the surface hardness, even in large sections. Such parts can take extensive metal removal without developing a lower surface hardness. In parts designed for wear resistance, the wear may continue indefinitely before insufficient hardness becomes a problem. Manganese is one of the most common alloys added for oil hardening.

The higher alloy content that gives air hardening properties (with minimum postheat distortion) usually means there will be an improvement over water hardening types in abrasion resistance. Molybdenum is one of the typical additions for air hardening steels. It is normally used in combination with other alloys to get an additive effect and to balance the properties of the steel.

Hot work tool steels are based on chromium, tungsten, or molybdenum, with other alloying elements present in substantial amounts. Used for forging dies, extrusion dies, and other parts subjected to severe service, they are good examples of alloying to produce properties not obtainable with carbon tool steels.

Mold steels must meet a different group of specifications. They are frequently machined from prehardened blocks. They must be as free as possible from any inclusions which would spoil the surface of the finished parts. Since mold cavities are sometimes produced by forcing a master shape into the mold steel at room temperature, the materials must take deformation without cracking. Chromium is a common alloy for such steels.

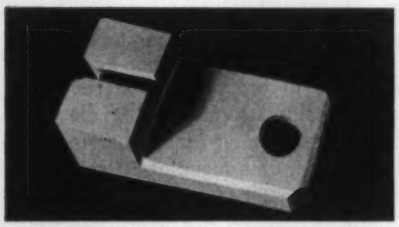
High speed steels are manufactured in many varieties. Some 25 are listed in a classification by a major user. Since they may be required to stand up to high temperatures under a wide range of conditions—heavy or light loads,

PROPERTIES AID DESIGNERS

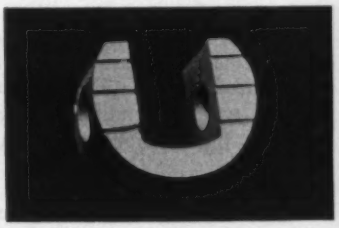
WIDER use of tool steels for structural applications has stimulated studies of their physical properties. Some of the information has been published; more is available on request from suppliers. It's eye opening.

Chisel steels show room temperature tensile strengths well over 300,000 psi, yields of more than 250,000 psi, and yet offer reduction of area values in the 30 per cent range, elongations of around 10 per cent. Hot work die steels have similar room temperature properties and show tensile strengths of over 200,000 psi at 1000° F, more than 40 per cent reduction of area, and well over 10 per cent elongation. Compressive strengths of more than 500,000 psi and fatigue endurance limits over 125,000 psi are not uncommon.

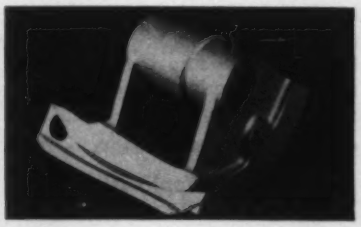
Such values have posed one problem: Gripping the bars in tensile testing machines!



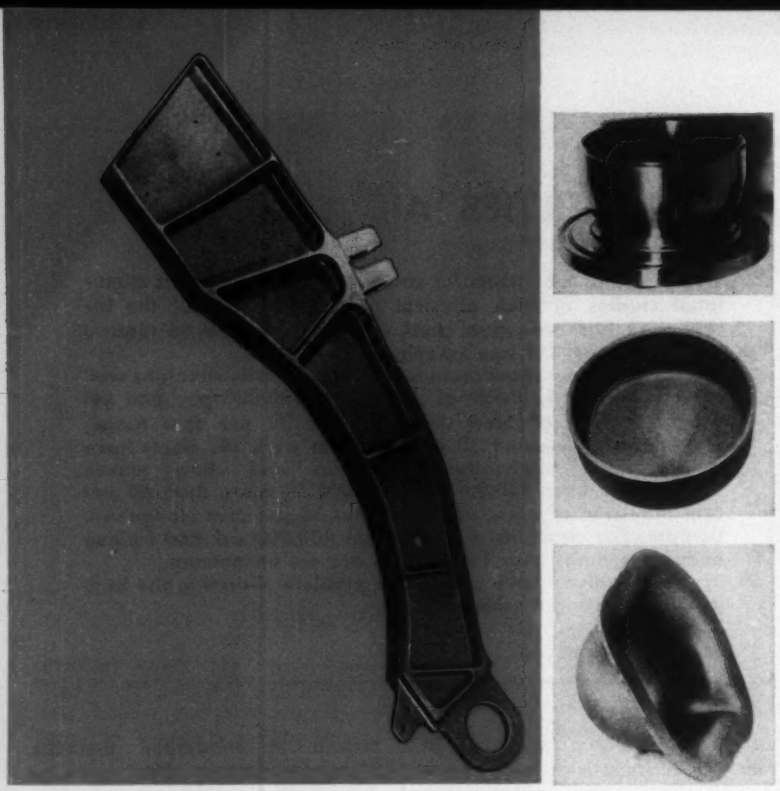
2. T-4 material



3. A-2 alloy



4. S-2 analysis



These parts are made from H-11, modified. At left is an aircraft support lug, more than 3 ft long. Upper right is a machined forging for a missile. Right center: A deep drawn, straight sided cup, 6 in. OD by 2¼ in. deep, cold formed in one stroke from a 3/16 in. thick plate. Bottom right: Hydroformed cold in one pass from ground 0.170 in. plate. (Source: Vanadium-Alloys Steel Co.)

shock loading, severe abrasive environments—alloying elements are added to develop required properties. Relatively large amounts of tungsten, molybdenum (or both) are combined with chromium and vanadium in the basic analysis. Optimum heat treating conditions are specified by its makers. Deviations should be viewed cautiously.

• **Recommendation** — A quality steel deserves quality heat treatment. While today's tool steels will stand up in service even if the heat treatment is not optimum, care and close control will pay off.

Frequent checking of pyrometer equipment will insure that indicated temperatures are true values. Atmosphere controls and salt bath conditions can drift; test samples of steels should be examined regularly to make sure that results are right. Tempering takes time; cutting an hour off the cycle can cut days from service life.

Tooling Applications

Robert Hook, chief metallurgist, Warner & Swasey Co., Cleveland, has this to say about grades like M-4 and T-15: "These super-high-speed steels have, as their chief advantage, a greatly increased number of pieces machined per tool grind, rather than increased surface feet a minute — though the speed can be increased on many applications. These materials offer two to six times as many pieces per grind as the standard 18-4-1, (T-1) operated at the same speed. On the other hand, speeds can be increased by as much as 50 per cent with the same number of pieces per grind as before."

Despite significant gains by carbide and ceramic (oxide) cutting tools, high speed steels are still preferred in a large share of the applications where their strength is important. Some of the more complex tools, too expensive to make from carbides, also are naturals for high speed steels. They include certain types of milling cutters, broaches, intricate form cutters, and gear hobs.

• **A Shift**—At Pratt & Whitney Mfg. Co., West Hartford, Conn., Metallurgist Ernest W. Bancroft cites a move from an M-1 grade to an M-7 for shank type milling cutters. Reason: Better wear resistance.

Mr. Bancroft also tells STEEL that the more difficult machining jobs with aircraft and missile materials are putting increased emphasis on tools made from M-3, M4, and T-15 grades. T-15 is getting the lion's share of the jobs, but some users find it difficult to regrind.

(In a booklet, "How to Select Wheels for Precision Grinding Tool and Constructional Steels," engineers at Norton Co., Worcester, Mass., classify T-15 as one of the most difficult to grind, requiring soft, free cutting wheels. Although they point out that it is impossible to recommend any general wheel specification or set of conditions to suit all cases, they add: "T-15 steel can be ground adequately and efficiently.")

• **Heat Resistance**—T-15 is recommended for twist drills and cutters for machining parts heat treated to a Brinell hardness of 400 to 500, says Dr. W. R. Frazer, chief metallurgist, Union Twist Drill Co., Athol, Mass. Its red hardness is its chief asset for these jobs.

For working on components treated to 300 to 400 Brinell, Dr. Frazer suggests tools made of the M-3 (Type 2)—it has both high edge strength and high abrasion resistance. High speed types finding increasing usage, says Dr. Frazer, include M-7, M-3 (Type 2), and T-15.

Makers of tool steel are searching for ways to improve the wear resistance and red hardness of their high speed steels. Reportedly being tested: A high speed steel that will perform competitively with C-5 and comparable carbides.

• **Trends in Diemaking**—Die requirements are critical in a lot of the new hot forming jobs. Many of the metals are abrasive and still hard at forging temperatures. Added vanadium and carbon are being used to boost the wear resistance. On the jobs where the die heats excessively, it may become annealed. One metallurgist speculates: An entirely different kind of die material may be needed for these jobs—perhaps a cast cobalt alloy.

SELECTION

Tips on Ordering Tool Steels

TYPE Order by tradename or specification. Give details concerning use and other pertinent information to assist seller in supplying the steel in best condition for specific needs and to permit recommendations of a more suitable or alternate grade.

QUANTITY Specify in pounds, in feet, or in number of pieces.

SIZE Give diameter for rounds; width and thickness for flats; and distance between parallel surfaces for octagons or hexagons; also state whether rough or finished dimensions are given because no allowance for finishing will be made otherwise.

SHAPE Round, flat, square, hexagon, or octagon are standard. Special shapes should be sketched and accurately dimensioned. In ordering rings, discs, and hammered bars, state finished dimensions after machining so that proper forging allowance can be provided for.

LENGTH Random or exact; exact lengths take extras for cutting and wastage.

FINISH Hot rolled, rough turned, forged, cold drawn, centerless ground, pickled, or polished.

CONDITION Annealed, heat treated, or unannealed (as-rolled).

TOLERANCE State maximum and minimum size tolerances.

HARDNESS Specify when approximate or definite limits are required for a particular application.

ANALYSIS Instructions regarding certificates of analysis, physical tests, and other services (furnished on request) should be complete.

SHIPPING Specify: Bundles, wrapped, or boxed; shipment via parcel post, express, rail, or by truck. Mention special details concerning marking.

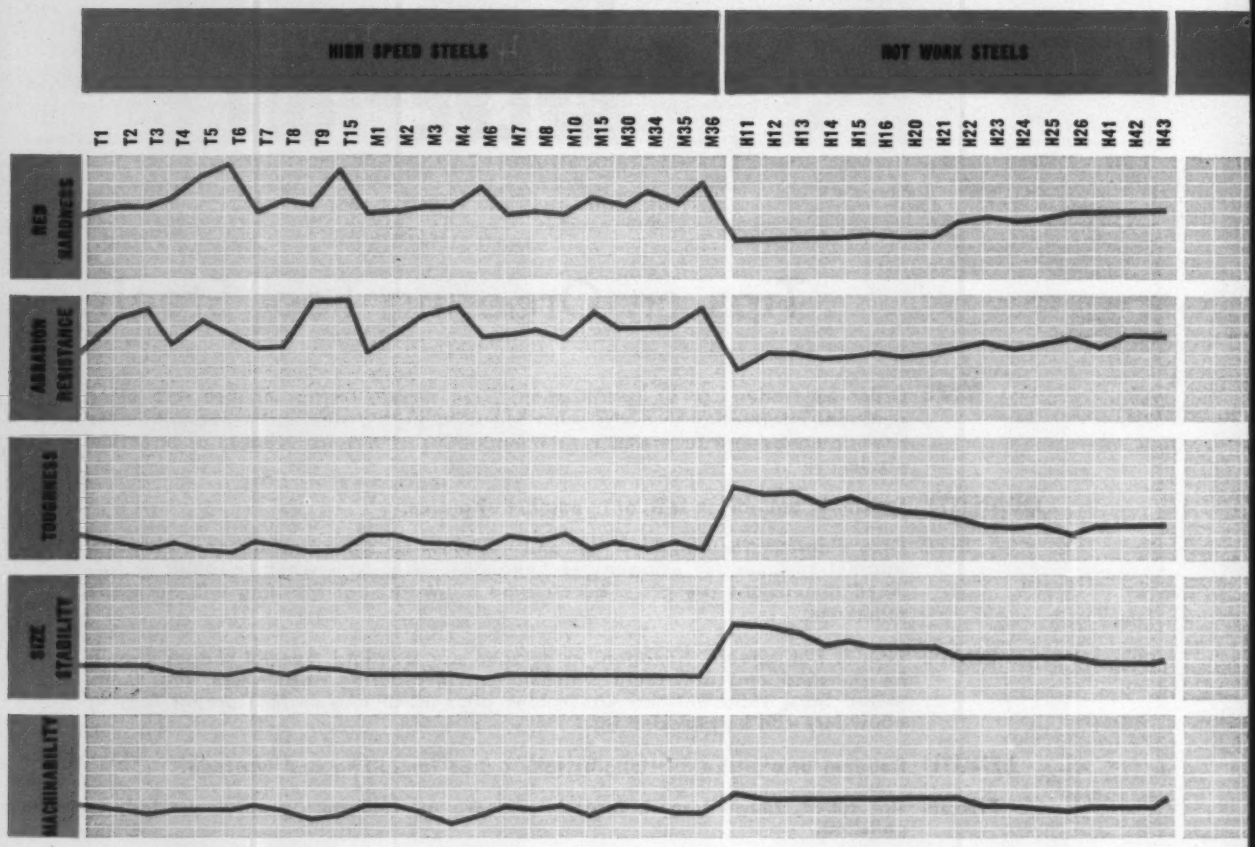
INVOICING Give instructions.

(The above is STEEL's composite of instructions published by producers.)

SAY the preceding section has suggested a nontool application for tool steels that could solve one of your materials problems, and you want to investigate further. The information here will simplify your search for the right material and also give you some tips on ordering (see adjacent exhibit).

• **Big Problem**—Selection can be perplexing to the uninitiated. Tool steels are offered in eight basic types—carbon (water hardening), high speed, hot work, air hardening, oil hardening, shock resisting, mold, and special purpose—but they are marketed under more than

WHAT TOOL STEELS HAVE TO OFFER


HIGH SPEED STEELS
HOT WORK STEELS
T1 T2 T3 T4 T5 T6 T7 T8 T9 T15 M1 M2 M3 M4 M6 M7 M8 M10 M15 M30 M34 M35 M36 H11 H12 H13 H14 H15 H16 H20 H21 H22 H23 H24 H25 H26 H41 H42 H43
RED HARDNESS
ABRASION RESISTANCE
TOUGHNESS
SIZE STABILITY
MACHINABILITY

1200 tradenames which represent more than 80 standard grades, all with slightly different combinations of properties.

The grade you choose depends upon your requirements for toughness, hardness, temperature resistance, abrasion resistance, dimensional stability, and machinability. The exhibit appearing on these two pages will help you select materials on the basis of comparative properties.

These tips from a producer are also pertinent:

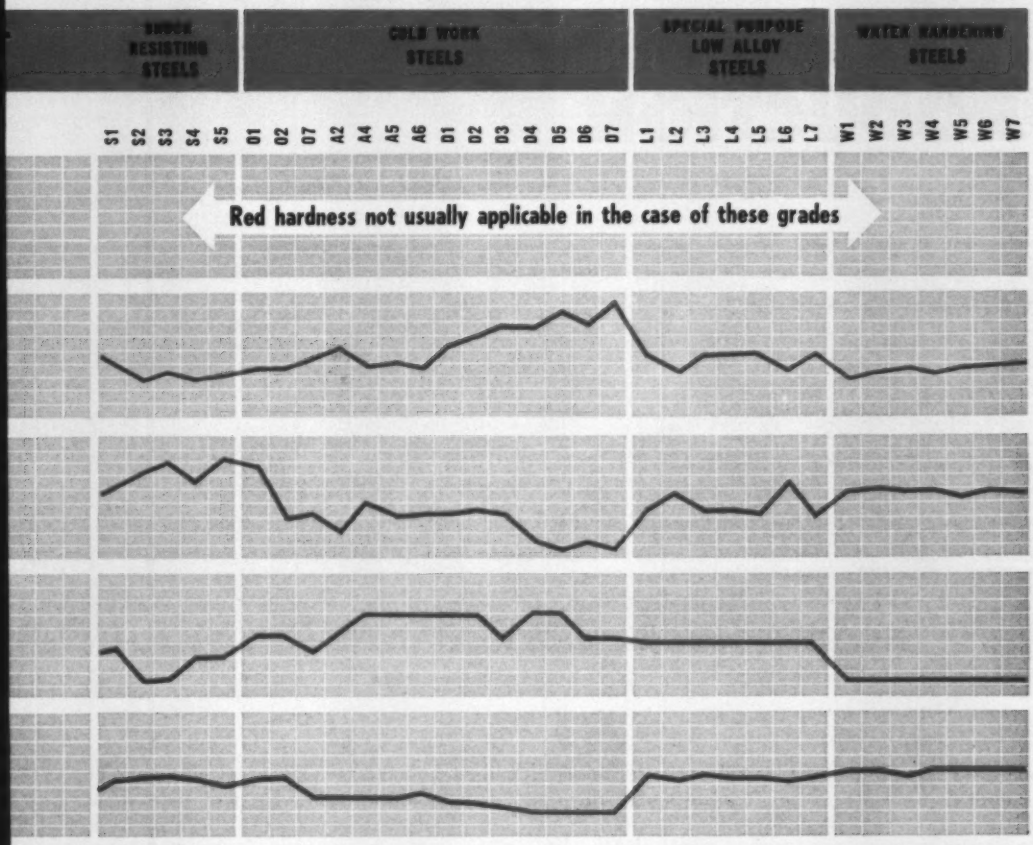
- Select a carbon level that will give you the desired wear resistance-toughness ratio.
- If the design is intricate, or movement and distortion must be held to a minimum, apply the air hardening types.
- For maximum safety in heat treatment, apply the oil, or preferably air hardening, cold work types.
- If the tool or component becomes heated in service, apply a hot work or high speed type that has sufficient red hardness.
- If the tool or component is subject to intermittent heating and cooling, apply a low carbon, hot work type.

Another Problem—Finding out what's available can also be a problem. More than 70 sources (including producers, steel service centers, and distributors) market tool steels under their own tradenames. (Sixteen North American producers are listed on Page 128.) One of the best single sources of information on analyses and properties of tool steels can be obtained from the American Iron & Steel Institute. (Ask for its "Steel Products Manual, Tool Steels.")

More detailed informative literature is also offered by tool steel producers.

The institute lists tool steels in terms of standard designations rather than tradenames, a practice which it and some producers are promoting to simplify the user's job of finding out what's available and also help him in ordering.

This chart, prepared for STEEL by Allegheny Ludlum Steel Corp., Pittsburgh, can help you choose the grades most likely to meet your requirements. Final selection will depend on specific properties and price. The table includes all the commonly used AISI grades.


SHOCK RESISTING STEELS
COLD WORK STEELS
SPECIAL PURPOSE LOW ALLOY STEELS
WATER HARDENING STEELS
S1 S2 S3 S4 S5 O1 O2 O7 A2 A4 A5 A6 D1 D2 D3 D4 D5 D6 D7 L1 L2 L3 L4 L5 L6 L7 W1 W2 W3 W4 W5 W6 W7
Red hardness not usually applicable in the case of these grades

The campaign is making headway, but some users still prefer to order by tradename.

• **Distribution**—Except for high speed steels, it's estimated that 50 per cent of the tool steel sold is distributed through service centers and warehouses, which are either mill owned or independently operated. High speed steels are more likely to be bought from mills because they are often ordered in production quantities. The average order of tool steel runs 100 to 200 lb.

The trend in recent years has been toward greater dependence on service center stocks. By relying on service center inventories, users find they can unfreeze large sums of money, save storage space, reduce their needs for handling and processing equipment, and minimize the risk of obsolescence.

• **Prices**—Tool steels must be of consistently high quality because they must not fail. Often the labor invested in machining them costs many times the cost of the material. Base prices of the more common grades range from 26 cents to $4.33 a pound. All materials are sold on base prices, subject to extras, deductions, and freight.

• **Many Shapes** — The commonly marketed forms are these:

Hot rolled and cold finished bars —available in all grades—can be purchased rough or with turned, ground, or polished finishes.

Rolled and forged special shapes —available in all grades.

Forgings—available in all grades.

Wire—available in all grades. Shapes include round, oval, square, and hexagonal.

Drill rod—available in all grades.

Hot rolled plates, strip, and sheets —available in all grades.

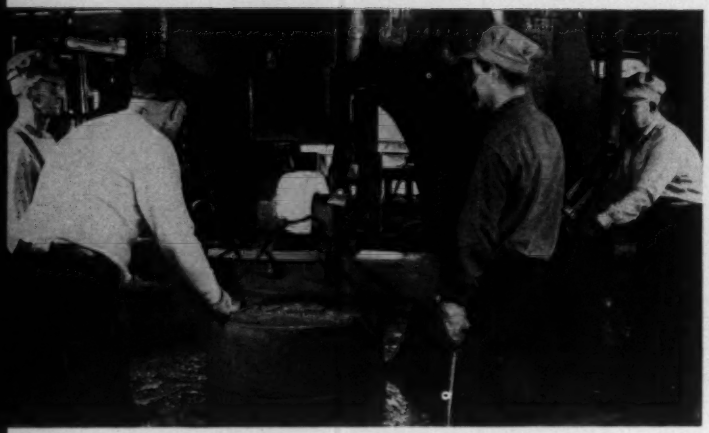
Sand or precision castings—available in all grades.

Tool bits—high speed steels, furnished as heat treated, semifinished cutting tools, in squares, flats, rounds, or special shapes.

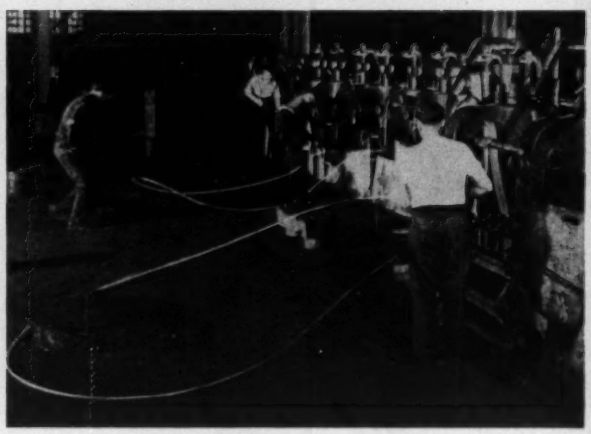
Precision ground flats—available in the most popular tool steel grades.

PRODUCTION

Precision melting makes steel . . .



. . . that may be hammer forged . . .



. . . or rolled into rods

TOOL STEELS are tailormade to meet tight analyses and performance specifications. If the user can't find the material he needs in the producer's regular line, he can have it made to order.

Small heats are the general rule. Electric arc furnaces, up to 15 tons in capacity, melt steel scrap and alloying materials and account for most of the output. Some special grades are melted in consumable electrode vacuum arc or vacuum induction furnaces. Some air melted metal is vacuum degassed.

• **Step No. 1**—Close analysis control begins with raw materials.

Chemical content of scrap must be known when the furnace is charged. The material is segregated by alloy content before it is shipped to the producer's plant. There it is sampled by laboratory personnel and rejected if tests don't verify the promised analysis.

Purity is also a must for the ferroalloys used in the heat. Variations would make it more difficult to turn out steel with the right alloy content. And tolerances are close on alloy percentages. Example: Chromium content isn't allowed to vary more than 1/4 per cent in a typical tool steel.

• **Extreme Care**—Charge materials are weighed carefully; steel and slag are tested constantly during the melt.

Scrap and other raw materials are charged into the furnace; electrodes are lowered to strike an arc; and the material is melted down. Earlier furnaces were side charged, but removable roofs on newer electrics permit top charging.

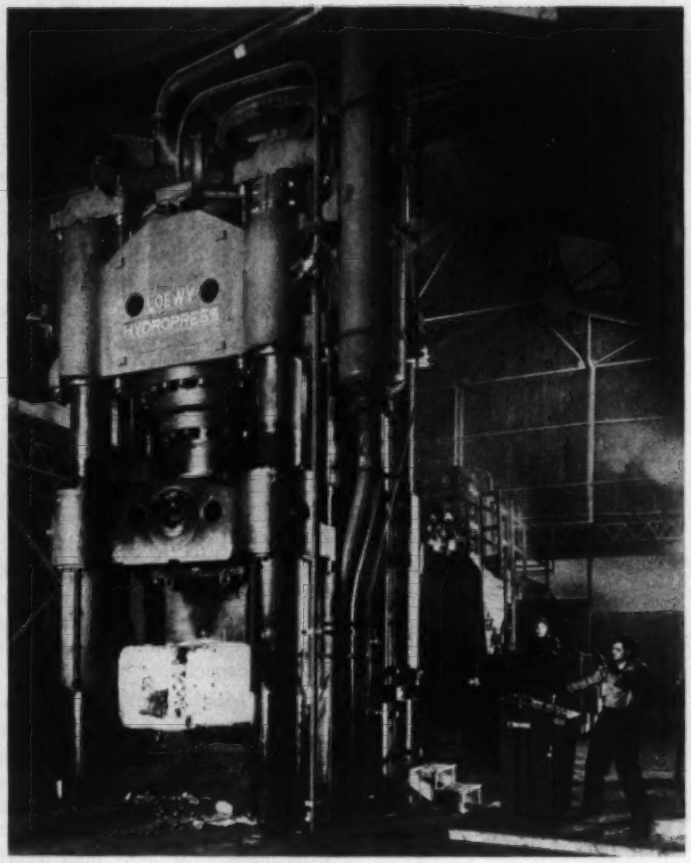
Slag making materials, such as limestone, silica, and fluorspar, melt and form a layer over the molten steel. The slag absorbs phosphorus, sulfur, and other impurities.

Samples for chemical and spectrographic analysis are taken repeatedly after the charge has melted. The first analysis tells the types and amounts of alloys in the charge. It also shows whether any undesirable elements, such as tin, lead, or copper, are present. Spectrographic equipment, used by several tool steel producers, analyzes the steel in 40 seconds, telling the amount of each element present (except for carbon, sulfur, and phosphorus).

The melter adds alloy materials for analysis adjustments; then another test is taken. Additions and tests are repeated until the right analysis is obtained.

The first slag (called the oxidation slag) is sampled repeatedly and tested for composition. An immersion thermocouple is inserted in the bath from time to time to check the temperature.

When tests show the heat is close to the right analysis, the first slag is usually skimmed off by tilting the furnace slightly. Then carefully measured amounts of lime, sand, fluorspar, and coke are introduced to form a second, or refining slag. It controls chemical analysis and



Hefty presses make bigger ingots forgeable

protects the bath from oxygen and other gases.

The molten metal is stirred to distribute alloys, insure uniform temperature, and increase slag effectiveness. The job is done manually with a long stirring rod, mechanically with a paddle on the charging machine, or electromagnetically with a system of coils mounted under the furnace.

After making major alloy additions, the melter orders another thermocouple reading and submits a final melt sample to the laboratory. When reports are returned, the heat is finished—final alloy and slag adjustments are made, another temperature reading is taken, then silicon and aluminum are added for deoxidation.

• **Next Steps**—The tool steel heat is tapped, poured into molds, and cooled with the greatest care.

The furnace is tapped and tilted, and the steel pours through a short spout into the ladle. Then the steel is poured into molds at a controlled rate to insure the right surface and internal properties in the ingots.

Temperature is extremely important. If the steel is too hot when it goes into the molds, carbide stringers may form; if it is too cool, inclusions will result.

Ingot mold shape and size are big factors in temperature control. And different cooling rates are required for various analyses. The hot top (a brick lined casting or a refractory mold) is placed on top of the ingot mold. Its purpose: To keep metal at the top of the ingot liquefied and feed molten metal into the ingot as it cools. That prevents cavities or "pipes" from forming in the center of the ingot. Some tool steel producers are using hot tops lined with an exothermic material; others are heating the ingot top with a small electric arc.

After cooling, the ingot is brought up to uniform temperature in soaking pits or other heating facilities in preparation for rolling or "cogging." The soaking also tempers or removes stresses developed as the ingot solidified.

• **Important Point**—The amount and rate of hot work are extremely important.

Ingots must be large enough to permit the right amount of hot work before the finished section size is obtained. Initial ingot breakdown —with a hammer or press, or in a mill—must be fast enough to control grain structure. Large crystals, formed when the ingot cooled, tend to tear, or separate. Kneading action in the initial hot work heals, or welds internal voids and reduces grain size.

But reduction rates must be kept under control to prevent breakage. Surface separations can't be healed after contact with the atmosphere.

• **Costs**—Elaborate surface conditioning and testing contribute to the high selling price.

Product yield is low because so much steel is lost in ingot hot tops, ends cropped from billets and bars, and in surface conditioning. All defects must be removed from the steel before each rolling or forging. That makes for more handwork. One authority says tool steels are made by men, instead of machines; he says about 200 manhours are required per ton of tool steel, more than ten times that required for carbon steel.

Billets and blooms are usually cleaned all over, with a grinding wheel, before each reheating and rolling. No decarburization is permissible on the surface before heating, and furnace temperatures must be controlled to prevent decarburization.

Billets are usually tested for internal soundness with an ultrasonic Reflectoscope or other flaw finding equipment. A disc is often cut from each bar, hardened, then fractured and examined under a microscope to be sure metal microstructure is up to par.

• **More Controls**—Close temperature control continues in rolling and forging.

Each customer's steel gets special treatment, depending on its intended use. Increased straightening, turning, and centerless grinding

equipment insures a cleaner product with less material to machine away. Sophisticated heat treating equipment makes for more predictable performance.

• **Trends**—Production practices are changing constantly to meet the demand for better steels and larger sections.

Forging hammers are used in most shops for ingot breakdown, or cogging, if a large finished section isn't needed.

Hydraulic presses (in 1500 to 3000 ton sizes) are becoming extremely popular in the industry because they can handle bigger ingots. Some steelmen say the squeezing action of the press does a better job of healing internal flaws, but others don't agree.

A cogging mill with gothic, or notched work rolls is used at Latrobe Steel for ingot breakdown. The company says internal working of the steel is highly satisfactory. Conventional blooming mills are used for cogging by Timken and other companies with good results.

Many producers are using or considering vacuum melting or vacuum degassing equipment in tool steel production. They are ready to produce the vacuum melted grades if users are willing to pay the necessary premium price for the extra processing.

Vacuum induction furnaces can be used in tool steel making, but the process is costly. Air melted electric furnace steel is sometimes remelted in a consumable electrode vacuum arc furnace; the product is extremely pure and slightly less expensive than vacuum induction melted metal. For an extremely pure product, some companies, including Crucible and Universal-Cyclops, can make steel in a vacuum induction furnace, then remelt it by the consumable electrode method.

The Hopkins process, a consumable electrode method that protects metal purity with a slag blanket instead of a vacuum, will permit Firth Sterling to turn out premium tool steel (or other high performance metals) if user requirements justify production cost. The process is said to compare favorably in cost with its vacuum counterpart.

Vacuum treatment, or degassing of molten metal, removes fewer impurities from the steel than vacuum remelting, but the treated product meets most present or anticipated tooling needs. It may get the nod in tool steel production because of its speed and modest cost.

Vacuum stream degassing is practiced at Bethlehem Steel and Universal-Cyclops. A vacuum processing system, under construction at Crucible, will permit small batches of steel to be drawn from the ladle into a vacuum chamber for degassing, then returned to the ladle. The operation is repeated until most gases and other contaminants are removed.

Tool steel makers are also turning more attention to annealing to control hardness and surface chemistry of their products. A continuous, controlled atmosphere furnace has been installed at Vanadium-Alloys Steel's Latrobe (Pa.) Works. A similar furnace is to be installed at the company's Colonial Steel Company Div. at Monaca, Pa.

• **Supply**—Industry capacity traditionally exceeds tool steel demand.

All producers agree that they could produce up to twice their present output without enlarging their facilities. But production potential would be determined partly by the product mix required.

One steelman says if the market increased appreciably, producers would have to expand certain finishing facilities to give tool steel users the service and delivery they need.

North American producers shipped over 96,000 tons of tool steel in 1959. But Europeans also are turning out considerable tonnages.

• **Growth**—Expansion isn't often necessary in the tool steel industry, but modernization programs sometimes boost capacity.

A 50 in. consumable electrode vacuum arc furnace will be installed at Allegheny Ludlum's Watervliet (N. Y.) plant. A 50 in. crucible will be used in the furnace to remelt tool steel and many other steels.

A modernization program just completed by Vanadium-Alloys, at a cost of $3.5 million, includes a new consumable electrode vacuum arc furnace, new bar mills, and a continuous annealing furnace at Latrobe. A 2000 ton forging press was installed at the company's Colonial Steel Company Div. Some of the company's plans: Further modernization at Colonial, additional quality control laboratory and office facilities at Latrobe.

Braeburn Alloy Steel recently installed a 1500 ton forging press at a cost of $1.5 million. More expansion is being considered.

Melting facilities are being moved from Jersey City, N. J., to McKeesport, Pa., by Firth Sterling. The company will be able to make 20 in. ingots in a new Hopkins process furnace that is being installed.

Drill rod production at H. K. Porter's Vulcan-Kidd Steel Div. has been modernized with new draw blocks and straightening equipment. And the division has doubled its controlled atmosphere rod annealing capacity.

The "InFab" room at Universal-Cyclops may be used by the company to make and test tool steels for future applications. The room will contain an argon atmosphere; its equipment will be operated from external pulpits, or by men wearing space suits.

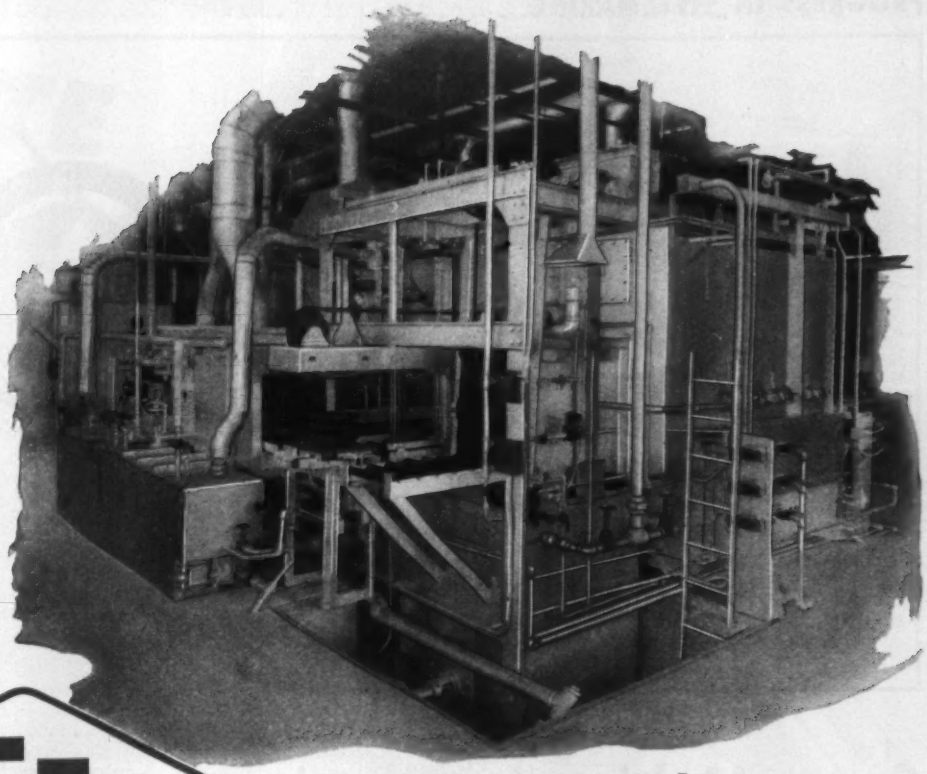
Continuous casting facilities may be used by Atlas Steels Ltd. to make tool steel. The company recently installed additional salt bath annealing equipment and modified its bar mills to handle sections as large as 1 by 9 in.

Latrobe Steel installed a consumable electrode vacuum arc furnace in 1959 and expects to spend $1.5 million on capital improvements in 1960. Most of the money will be spent to enlarge buildings, making more room available for laboratories, and to install more modern handling equipment in the plant.

Recent additions at Carpenter Steel include a controlled atmosphere annealing furnace and a 1500 ton forging press.

Bar mills are being modernized and expanded at Columbia Tool Steel Co. The company is installing a new hydraulic bar straightener that will handle sections up to 12 in., depending on alloy content.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



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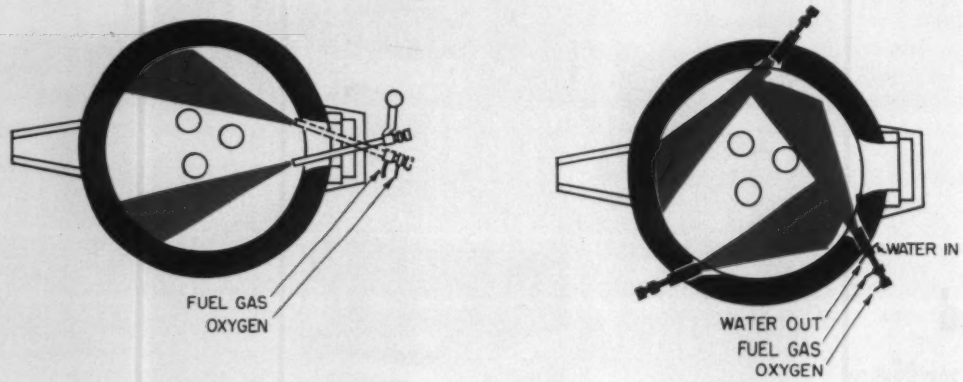

Door burner (left) is mounted on a pipe stand in front of the furnace. Water cooled, wall type burners (right) rest in steel pipe ports in the furnace lining and shell

Scrap Melting in Electrics Speeded by Oxy-Gas Burners

Closely spaced electrodes give long refractory life but sacrifice melting uniformity. Gas burners compensate by melting scrap around the edge of the bath

USE OF oxygen-fuel gas burners to supplement heat from electrodes in a steel melting furnace is expected to gain popularity. Such practice can boost production 15 to 20 per cent, cut power consumption, and make for more uniform scrap melting rates, claim G. W. Hinds, project engineer, and A. L. Hodge, associate manager, gas process development, development laboratory, Linde Co., a division of Union Carbide Corp., Newark, N. J.

• If power savings and production boosts don't justify installation of the burners, other factors favor them.

The burners can pay for themselves in short order on present furnaces where finishing capacity exceeds melting capacity, or where over-all output has to be increased. They are desirable when transformers are undersize, or the power supply is interrupted frequently.

The burners help melt scrap away from the walls, preventing electrode damage from scrap caveins and minimizing last minute analysis adjustments made necessary by scrap falling into the bath. They can be operated during each back charge; flames continue to melt the scrap during power-off periods. And light, voluminous scrap is more quickly melted.

• Design improvements have reduced burner noise; lower oxygen prices have helped encourage door and wall installations.

Newer burners are of the concentric tube type; oxygen flows through the center pipe, and gas flows through the outer one.

Door burners are often used in furnaces of less than 10 ton capacity, or in larger furnaces, to determine the feasibility of wall installations. One burner can be repositioned during meltdown to reach all unmelted scrap.

Three or more burners can be installed in furnaces of 10 to 200 ton capacity. Electrodes placed close enough to the furnace walls for uniform scrap melting would cause refractory damage, so the electrode circle diameter is usually less than ideal. The result: Slow melting around the edge of the bath. Wall burners compensate for the lack of heat between walls and electrodes.

• The burner installation should be uncomplicated for best results.

The door burner is usually mounted on a removable pipe stand in front of the furnace.

Water cooled burners, placed in uncooled, tangential ports, are said to be excellent for wall installation. Burners near the pouring spout are placed as far away from the tap-

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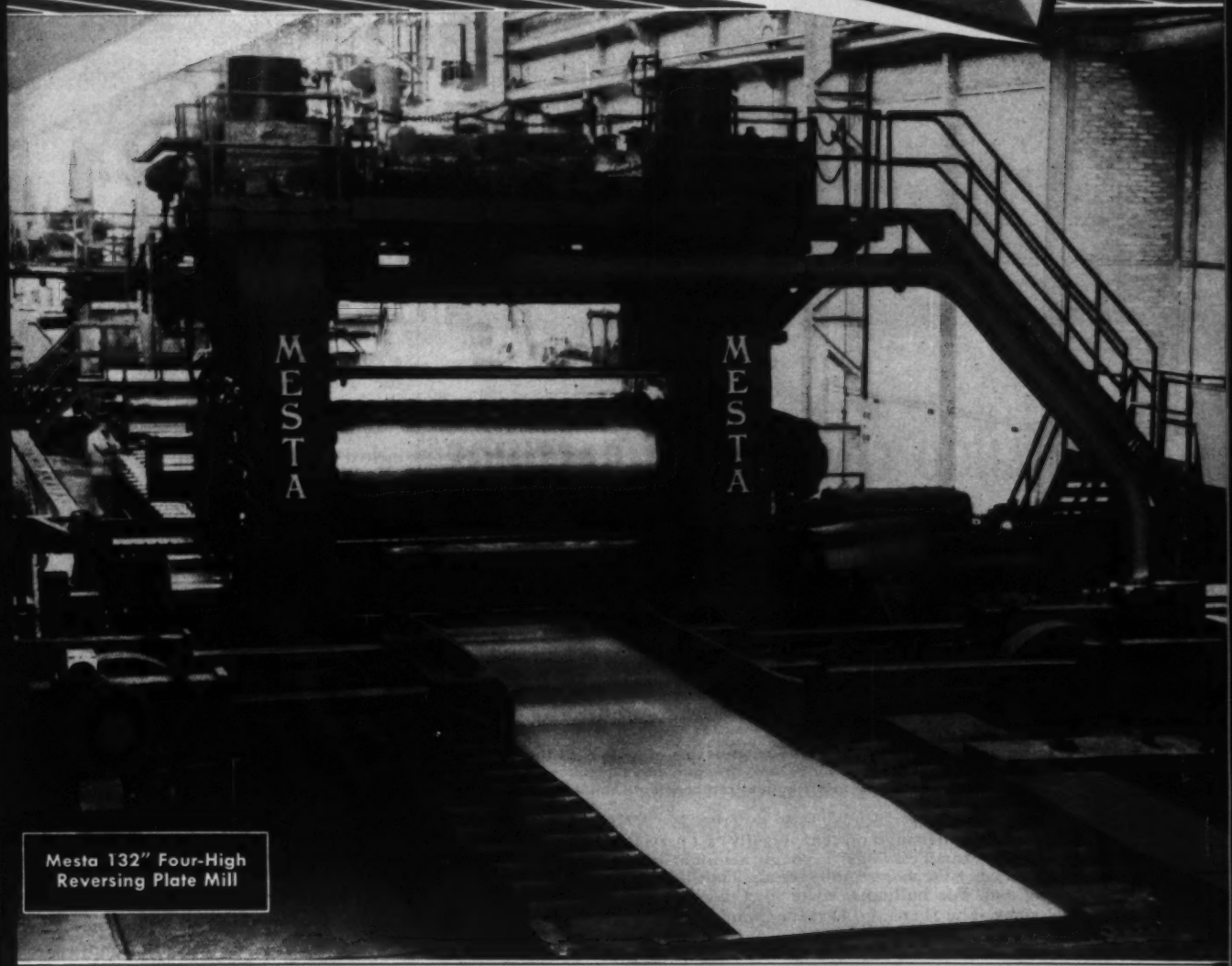

Mesta 132" Four-High Reversing Plate Mill

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hole as possible to prevent clogging.

Steel pipe ports are positioned in the furnace walls during reline. The burners can be pulled back as the lining wears thin, to prevent damage from falling scrap when the furnace is charged. Burners can be withdrawn easily if a water leak develops.

A control panel, usually installed near the furnace, includes oxygen and fuel gas meters, flow control valves, and pressure gages. Quick acting shutoff valves are provided for emergency use. An automatic safety valve stops gas or oxygen flow if pressure varies abnormally, or if the gas-oxygen mixture is out of tolerance.

• Burner operation varies with charging practice.

The burners are usually turned on after the furnace is charged and operated as long as they are effective on unmelted scrap.

Normal precautions associated with the ignition of fuel gas in confined areas are applicable when burners are started in a cold furnace.

When wall burners are ignited in a cold furnace, the burner nearest the door should be ignited first, then used to light the others.

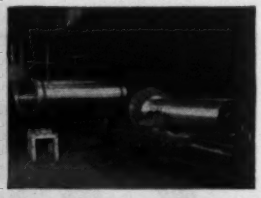
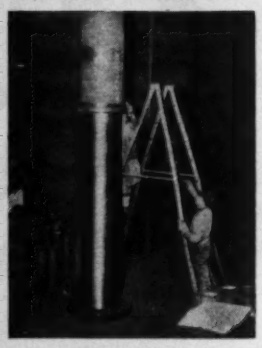
When a new charge is being melted down (using wall burners), flames should be adjusted to the minimum until the scrap immediately in front of the burners is melted, to prevent flame deflection against the wall.

The effect of burners on refractory wear and electrode consumption is not yet defined. But tests on furnaces of all sizes indicate normal wall wear and electrode life.

• Tests showed consistent savings in power and time on furnaces of various sizes.

On a typical test heat, two burners were fired through the side door of a 50 ton, door charged furnace at rates of 10,000 cu ft of oxygen and 7000 cu ft of natural gas per hour. Meltdown time was cut from 3¼ hours to 2¾. Power consumption was reduced from 23,500 kwhr to 19,000. Bath temperature at melt and furnace yield were apparently unchanged.

About 860 cu ft of oxygen and 545 cu ft of natural gas were used per ton of steel.

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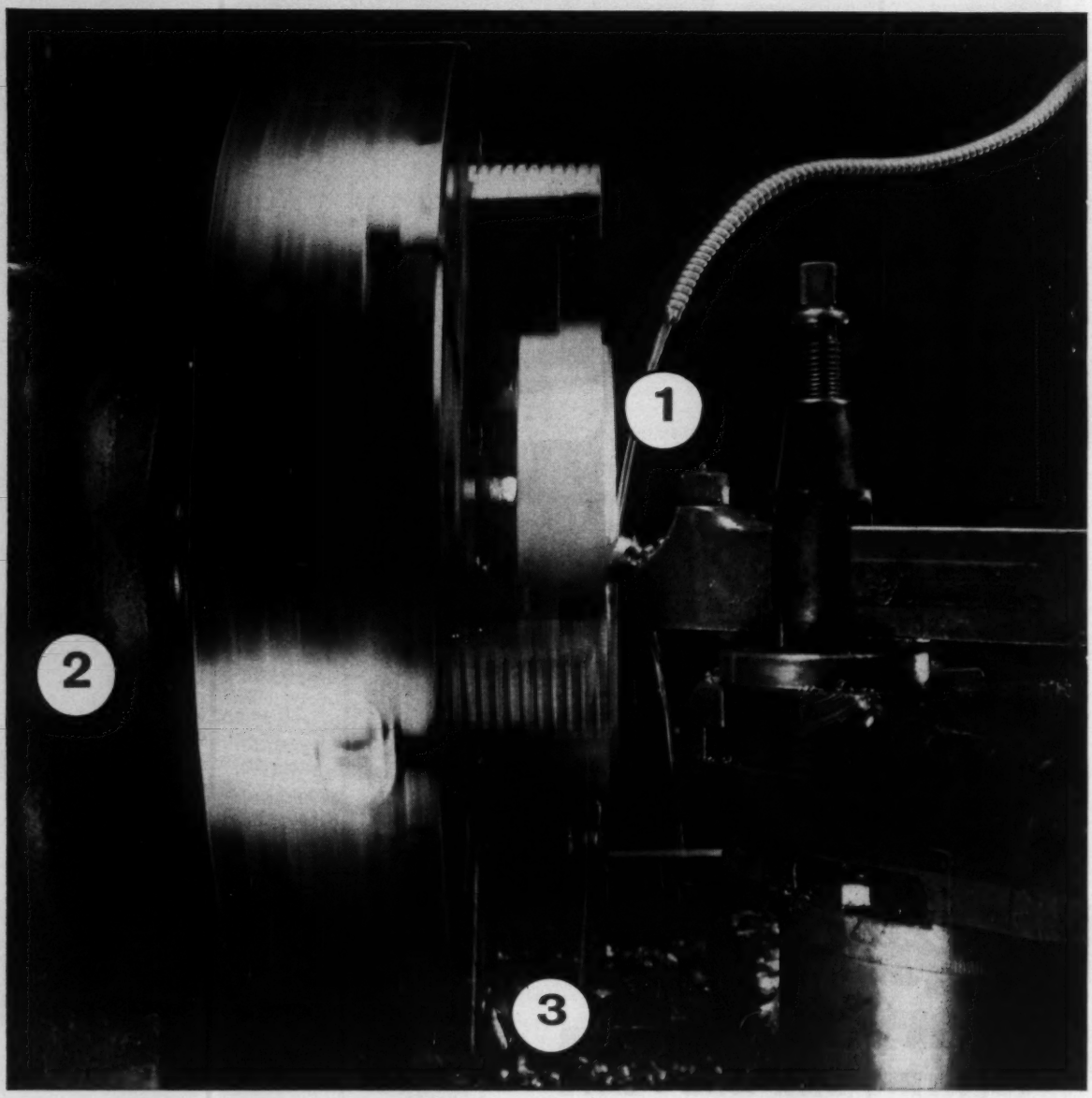

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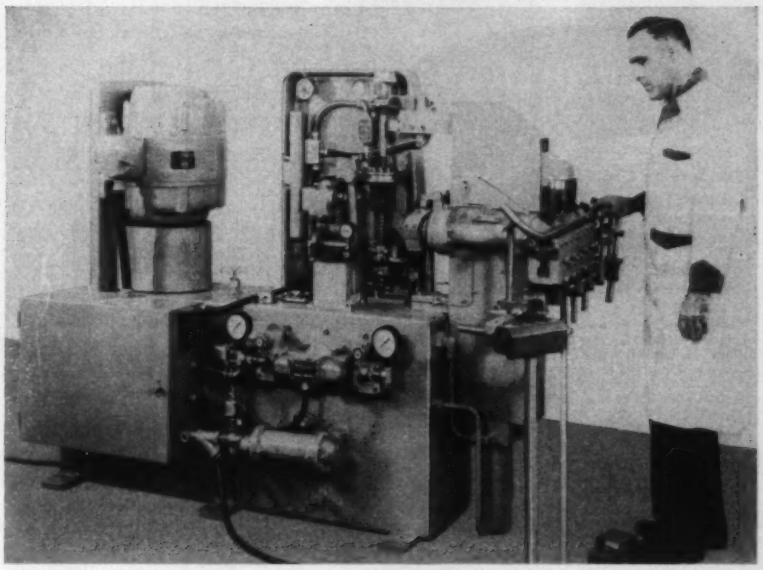
Setup time is minimized by the adjustable stop pins (pickout type). Preset pins can be stored as tooling for repeat work.

The press is hydraulically operated and self-contained. A 15 hp motor and pump provide a large volume of oil to the ram cylinder and wing die cushion cylinder.



Another Pines press (Model 30-T) does progressive bending of tubing up to 3 in. in diameter with a 0.125 in. wall. Production speeds go up to 800 bends per hour. Two 20 hp motors and pumps are used. The press is rated at 30 tons.

For further information, *see* them at the ASTME show or *write* Pines Engineering Co. Inc., 650 Walnut St., Aurora, Ill.

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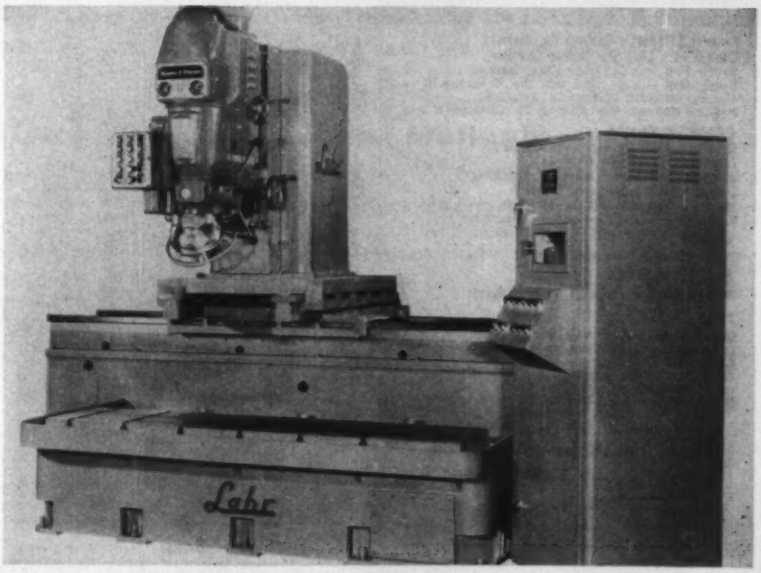

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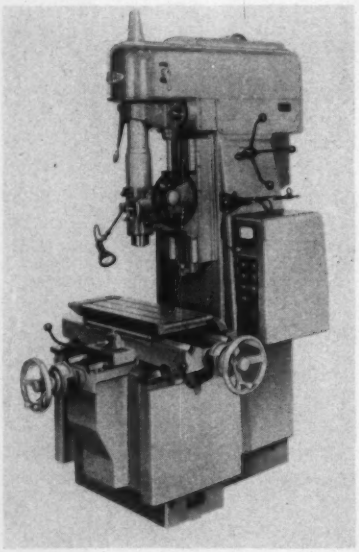
For further information, *see* it at the ASTME show or *write* Rice Pump & Machine Co., Belgium, Wis.

Borer, Grinder Use International Inch

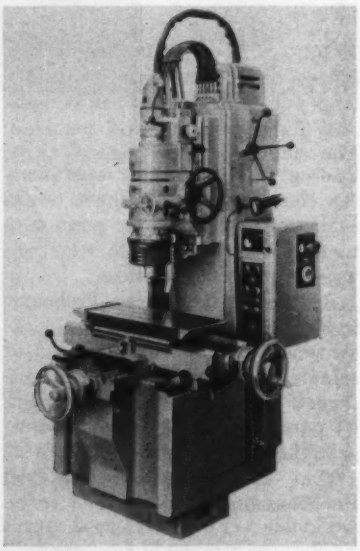
THESE jig borers and jig grinders perform work far beyond the former limitation of ten thousandths of an inch. Both have calibrations in the standardized international inch. The machines conform to JIC standards.

Model No. 3 Jig Borer—This machine is designed for location, boring, drilling, and reaming of holes in dies, jigs, and production parts. It has a speed range from 60 to 2250 rpm, an 11 x 24 in. table surface with a height allowance of 20 13/16 in., microsetting of the vernier dial, and more accessible cross clamping over previous models. Spindle speeds and feeds are centralized. Quick setting precision lead screws are used.

Model No. 3 Jig Grinder—Finer tolerances, greater range, and a larger table are improvements over previous models. It will accurately grind straight or tapered holes and regular or irregular contours to size



Borer



Grinder

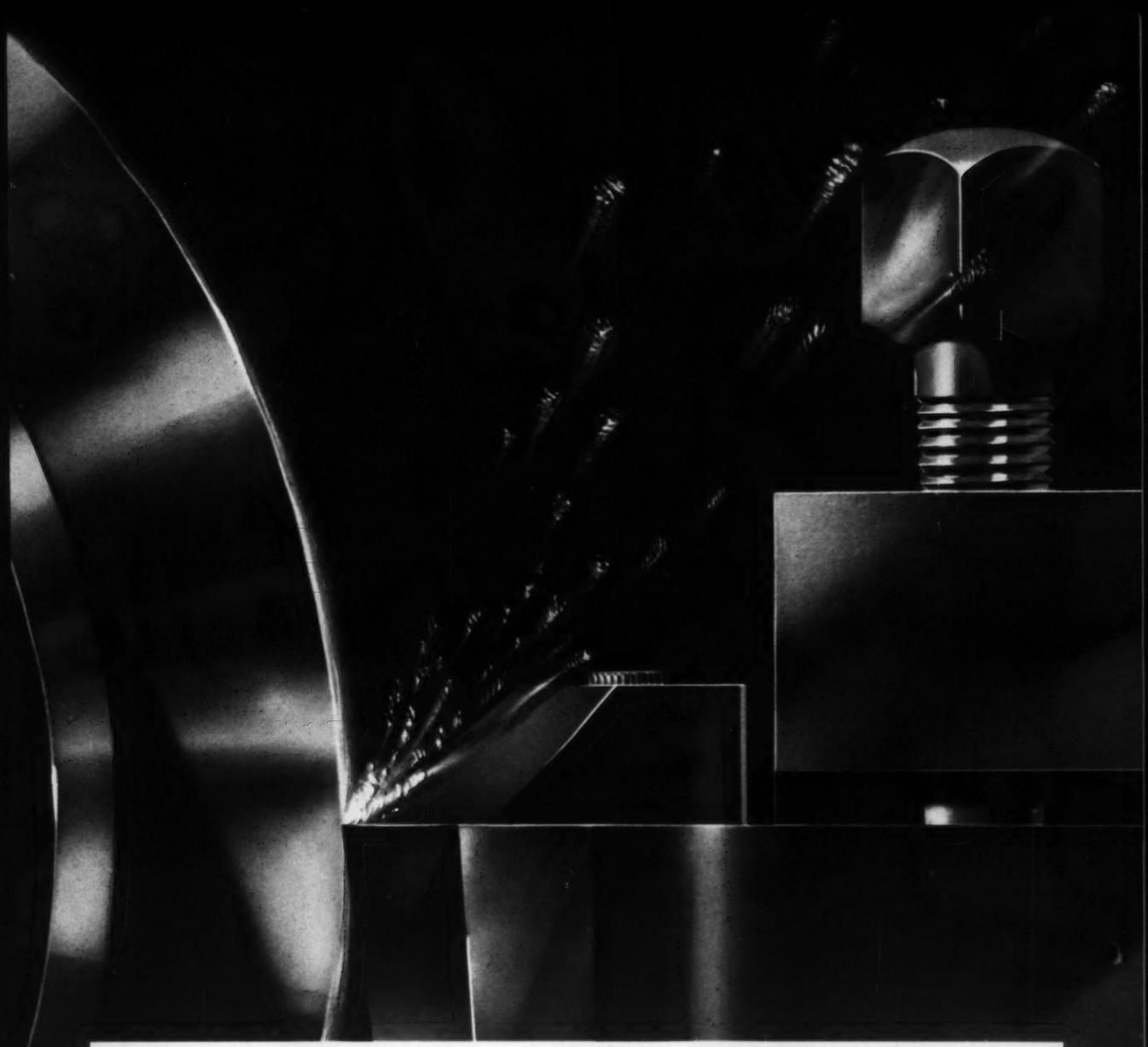


Illustration of Malleable casting being turned at 1,400 surface feet per minute with a 0.100" depth of cut using an oxide tool.

Cut Machining Time and Costs... Use Malleable

It's the **finished** cost of machined components that's important to you. Remember then . . . Malleable iron is the most readily machinable of all ferrous metals of similar properties. With Malleable castings you'll reduce machining time as much as 50% . . . increase tool life up to 250% . . . get unexcelled surface finishes.

Find out how much you can cut **your** finished parts costs. Contact any nearby Malleable castings producer who displays this symbol—

MEMBER
MALLEABLE
CASTINGS COUNCIL

For detailed information on "Machinability of Malleable Castings", contact any of the progressive companies listed on the opposite page, or Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

Really Tough Where the Power Hits the Ground—thanks to TOCCO* Induction Heating

The Eimco Corporation of Salt Lake City manufactures heavy-duty earth moving and mining equipment of many kinds. All of their equipment must be engineered for tough work in the roughest kind of terrain, and all of it runs on tractor track that must stand up to the toughest abuse.

Superior Quality

Recently Eimco installed a 100 kw, 10,000 cycle TOCCO machine for heat treating track links. This equipment assures a completely uniform hardness pattern—the same every time for one link or one million. Furthermore, the parts are drawn as well as hardened by one TOCCO machine with one operator.

Increased Production

In addition to superior quality, TOCCO increased track link production over 400%. Formerly, one man could produce 35 links per hour; now, with TOCCO, he produces 150!

Whether you're looking for product improvement, increased production, or lower unit costs, it will pay you to investigate TOCCO Induction Heating.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today—NEW FREE Bulletin

The Ohio Crankshaft Co. • Dept. S-4, Cleveland 5, Ohio

Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating."

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____

and location after hardening. Slot grinding and chop grinding operations are also accurately performed. Machine characteristics include infinite spindle speeds from 40 to 250 rpm, table work surface of 11 x 24 in. (18 in. height allowance), improved cross clamping accessibility, microsetting of the vernier dial, and quick setting precision lead screws.

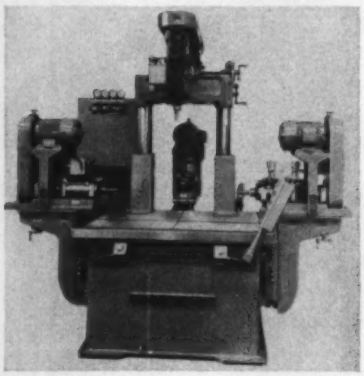
For further information, *see* them at the ASTME show or *write* Moore Special Tool Co., 748 Union Ave., Bridgeport 7, Conn.

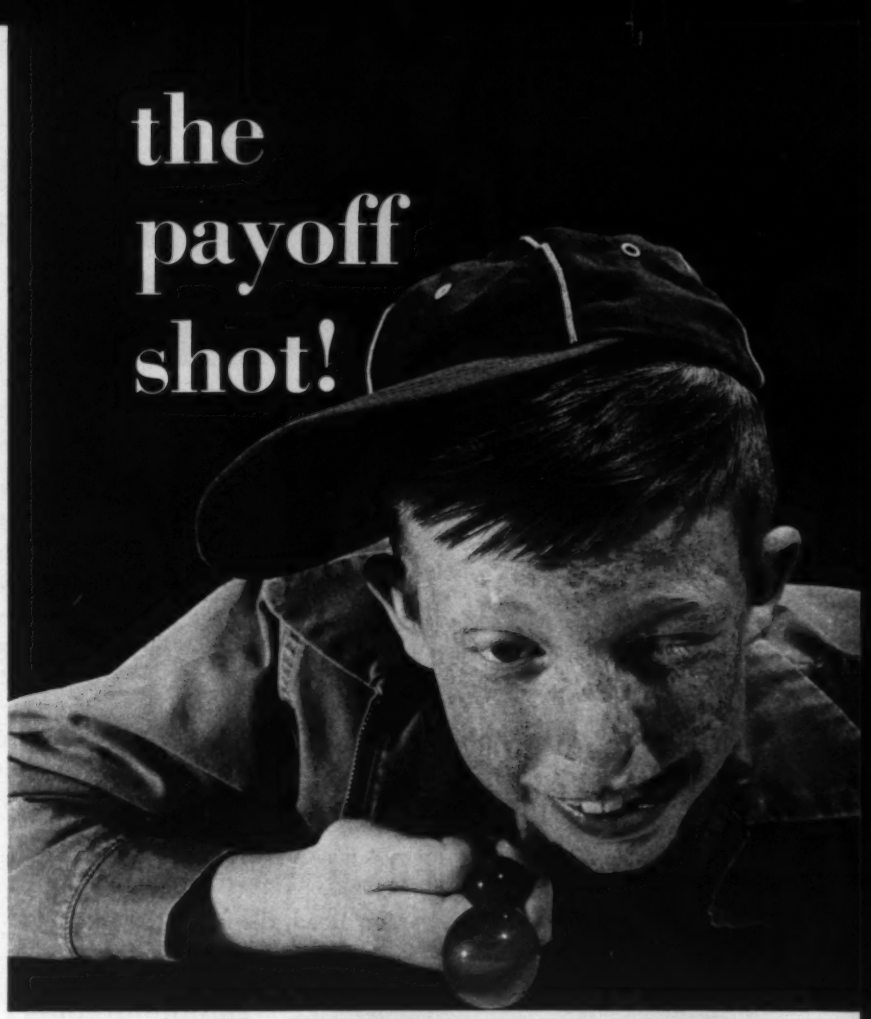
Versatile Machine Does Drilling, Tapping, Boring

A DRILLING, tapping, boring, reaming, and spot facing machine (the Wis-Matic) can perform operations on five sides of a piece in one work cycle. The machine is designed for fast production job changeovers. It's available with any combination of one to four horizontal power units and one vertical power unit.

Each unit is adjustable in the vertical, lateral, and longitudinal planes, and all vertical adjustments are counterbalanced. Each power unit runs independently of the others. With the cycle selector in the electrical control panel, you can actuate power units on the first or second pass or in any multiples. Instantaneous changeover from drilling to reverse tapping can be done from the master control station for any power unit.

The Wis-Matic is designed for Wisconsin package tooling. It's





AMASTEEL SHOT pays off for New England foundry!

Concerned about the cost of blast-cleaning grey iron castings, a New England foundry* compared performance of the malleable iron shot they had been using, with AMASTEEL shot, and with cast steel shot from another manufacturer. Results of the 7 months of tests: Consumption of malleable varied between 93¢ and $1.59 per wheel hour; the cast steel shot averaged $1.08 per wheel hour, and AMASTEEL *averaged 88¢ per hour!* Record-keeping and housekeeping were meticulous: Wheels and blades were kept in top shape; machines were purged between runs. And the payoff in dollars and cents was AMASTEEL! Castings were cleaned faster (ready for painting!)—at lower cost! One of 5 great abrasives made by a company with 25 years' experience, AMASTEEL can do wonders in *your* cleaning department, too! Ask for details, Booth 1135, Foundry Show!

**Name and case history on request.*

AMASTEEL

BOOTH 1135

ALLOY METAL ABRASIVE COMPANY

121 SOUTH DIVISION STREET
ANN ARBOR, MICHIGAN

PRECISION GRINDING Since 1944

Steel Mill • Rubber
Paint • Ink • Banbury
Calender Rolls

Investigate Universal's prompt, economical service for your largest roll grinding needs.

22" x 240" Roll Grinder with Superfinish

GRINDING SPECIALISTS

Centerless • Internal
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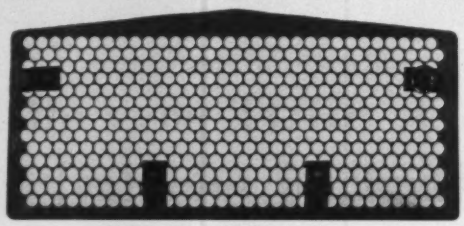
Contract grinding for millright service or parts finishing. Universal offers you one-source service covering *all* types of grinding with sufficient machines of each class to assure prompt service and low cost.

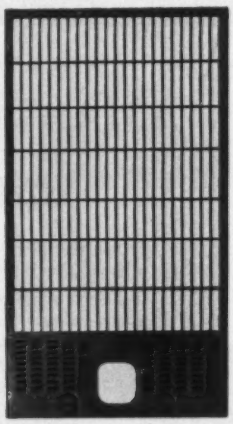
Telephone today and see (MAin 1-4363)

UGC **UNIVERSAL GRINDING CORP.**

2200 Scranton Road, Cleveland 13, Ohio



Rodent Guard for Electric Motor



Grille for Electric Heater

THEY SAVE MONEY
by letting
"DIAMOND" DO IT

For nearly half a century we have been furnishing perforated metal sheets, plates and parts to manufacturers of industrial equipment and household appliances, at lower cost than if the work were done in their own shops. No magic — just because we are especially equipped and organized for that type of work.

Let us quote on YOUR requirements. When given sufficient information, our experienced engineers are often able to make money-saving suggestions and always welcome an opportunity to do so.

Our new 32-page catalog illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern applications. Write for Catalog 59. No charge or obligation.

DIAMOND MANUFACTURING CO., WYOMING (Wilkes-Barre Area) PENNA.

Manufacturers of DIAMOND Perforated Metal Panels for Modern Acoustical Ceilings.

NEW PRODUCTS and equipment

primarily a holding fixture mounted to a base plate. Pressure regulated clamping is timed with the power units and is electrically timed to keep the power units from coming into action before the clamping cycle is completed. The multiple spindle drilling or tapping heads are mounted to guide bars, and tools are guided by suspended or fixed bushing plates.

For further information, *see* it at the ASTME show or *write* Wisconsin Drill Head Co., Butler, Wis.

10 ton Press Does Hole Punching, Notching Work

YOU CAN do fast, economical hole punching in angles, channels, extrusions, and sheets (plus notching) with the Unipunch press Model 1012. Available with this press are 37 round punches, 74 dies with four Unipunch hole punching units, and one Unipunch notching unit.

Other uses include punching extruded and countersunk holes, small louvers, and lanced holes; producing stampings with small die sets; and pressing threaded nut inserts into sheets or parts. Heeled punches and dies are available for hogging out larger diameters and shapes than the maximum 2 in. diameter provided with standard Unipunch

Soffel's Production Tested Thermotomic Sideboards increase

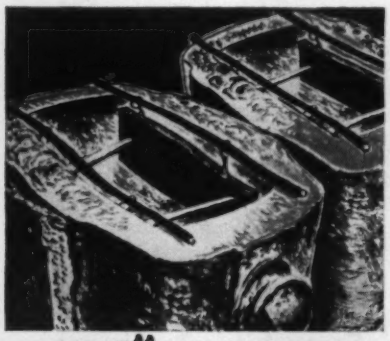
INGOT TO SHIPPING WEIGHT RATIO

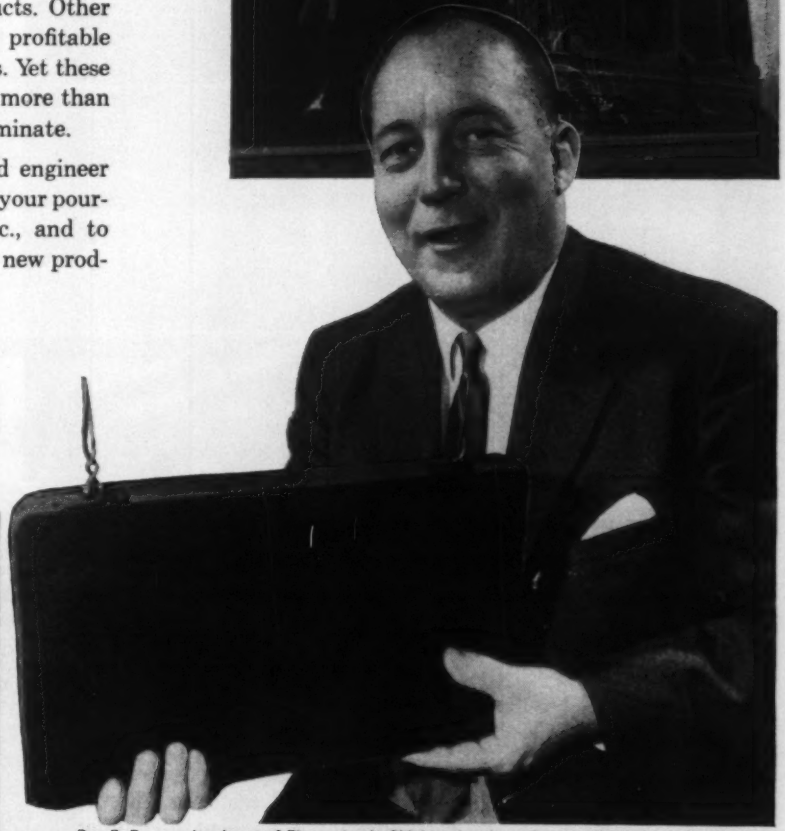
by 6 to 8% *Consistently*

Production tested on full heats up to 100 tons, Soffel's Thermotomic Sideboards are revolutionizing ingot yield percentages when used in the heads of big end-down slab molds. Metallurgical quality is maintained or improved in every case. One leading stainless producer verifies a conservative 6 to 8% increase in "out the door" products. Other leading producers report similar profitable results in carbon and other grades. Yet these exothermic Sideboards cost little more than ordinary hot tops which they eliminate.

We will be glad to design and engineer Thermotomic Sideboards to meet your pouring conditions, mold designs, etc., and to assist you in properly testing this new product in your plant soon.

Phone National 5-1571
for facts and figures — Today





Roy E. Ferree, developer of Thermotomic Sideboards, shows how easily they are handled.

PITTSBURGH METALS PURIFYING CO., INC.
Phone: NAtional 5-1571 • Mars, Penna.

"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

units. With a template, several Unipunch units may be set up for making a cluster hole pattern.

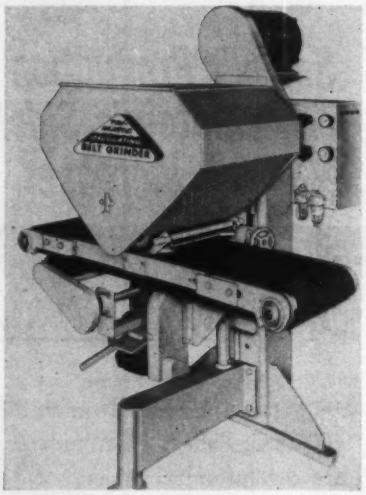
Press operation is air-hydraulic. It operates at 10 tons capacity from 65 to 75 psi air line pressure. Throat depth is 15½ in. without gaging.

For further information, *see* it at the ASTME show or *write* Punch Products Corp., 3800 Highland Ave., Niagara Falls, N. Y.

Oscillating Belt Grinder Has Fast Stock Removal

DEBURRING, grinding, and polishing can be done on the Tri-Matic oscillating belt grinder. The workhead is a self-contained unit. The workhead guard is equipped with two hold-downs for parts on the conveyor belt. The conveyor table measures 12 x 48 in.

Abrasive belts 6 to 12 in. wide and 80 in. long can be used. The manufacturer claims faster stock removal and longer belt life for the oscillating abrasive belt. Speed of the abrasive belt is 5000 sfpm. The conveyor has a standard speed range from 60 to 120 inches per minute. Other ranges are available. Conveyor belts can be quickly removed and replaced by fixtured conveyors for shaped parts.



For further information, *see* it at the ASTME show or *write* Sales Service Mfg. Co., 2363 University Ave., St. Paul 14, Minn.

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Your fastener specifications take shape with watchmaker's precision at ERIE. Our craftsmanship is backed by almost a half century of specialized experience. Since 1913, our sole business has been the production of fasteners to customer, government or national standards . . . fasteners to meet extreme temperatures, corrosion, tensiles, fatigue, impact, sheer stresses . . . fasteners for railroads, refineries, diesels, farm and earth moving equipment and other heavy machinery. This wealth of experience will return full value to you when you submit your fastener specifications to us.

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ERIE BOLT & NUT CO.
Erie, Pennsylvania
Representatives In Principal Cities

Broaches Combine Roughing, Finishing

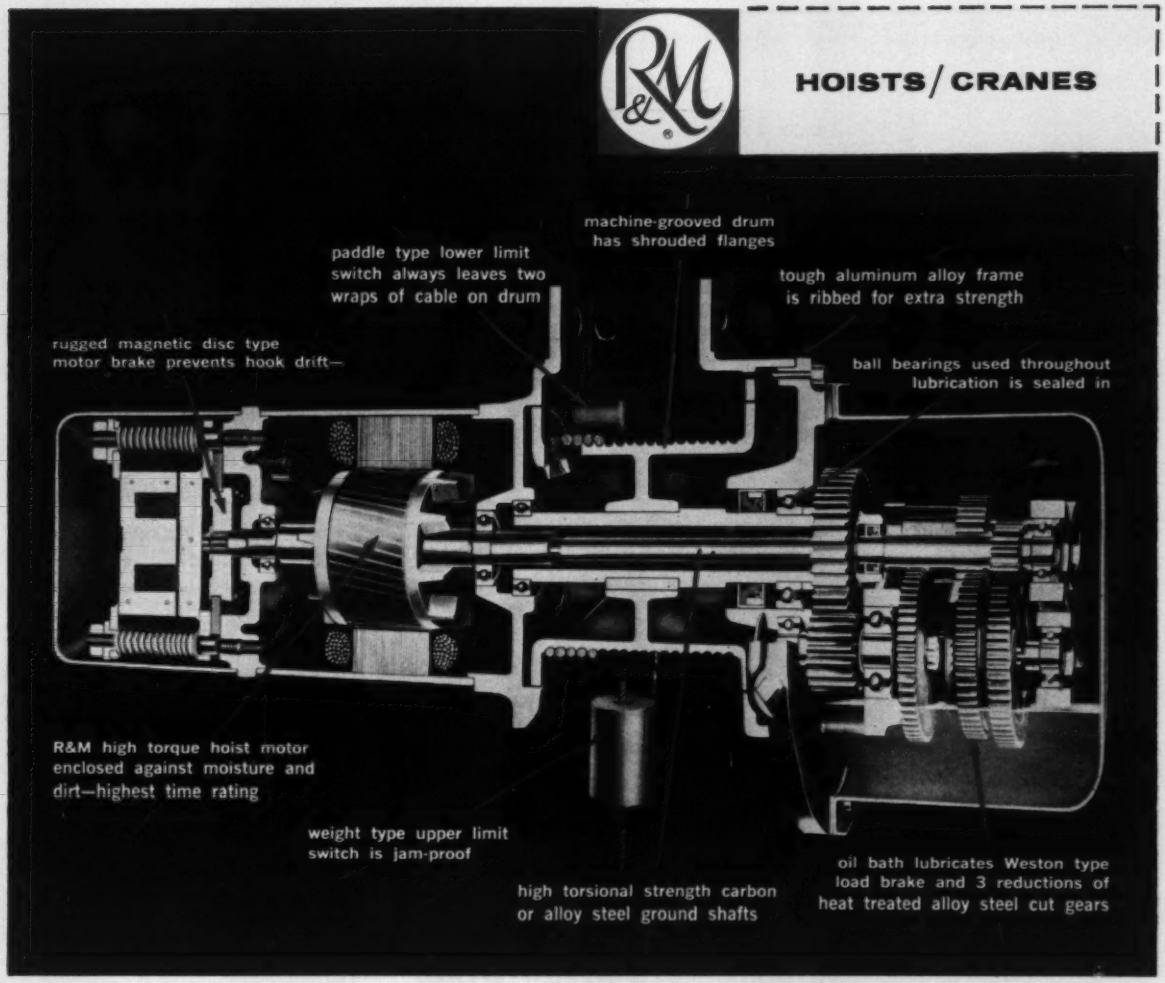
SMOOTH, precision gears or splines can be produced on Red Ring finishing broaches. They eliminate separate roughing and finishing operations.

The units combine a roughing broach and a removable shell type finishing section. An inside diameter finishing section can be mounted behind that for finishing the shell.

For further information, see *them* at the ASTME show or *write* National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich.

Bending Brake Quickly Forms Intricate Shapes

INTRICATE angle bending and radius forming can be done on the Lake Erie Model 414-C Form-All bending brake. Dies or tooling are not required. The model illustrated has a 4 ft x 14 gage capacity with


HOISTS / CRANES
machine-grooved drum has shrouded flanges
paddle type lower limit switch always leaves two wraps of cable on drum
tough aluminum alloy frame is ribbed for extra strength
rugged magnetic disc type motor brake prevents hook drift—
ball bearings used throughout lubrication is sealed in
R&M high torque hoist motor enclosed against moisture and dirt—highest time rating
weight type upper limit switch is jam-proof
high torsional strength carbon or alloy steel ground shafts
oil bath lubricates Weston type load brake and 3 reductions of heat treated alloy steel cut gears

HOIST VALUE WHERE YOU NEED IT

Robbins & Myers Type J hoists can go to work for you this week. Since they are stocked near you, it's no trick at all to see—and benefit from R&M's superb design advantages. They give value beyond competitive price: *because* no other hoist has a higher rated, better protected motor (30 minute, 55° C. rise), *because* you get two brakes—a disc type motor brake and a Weston type load brake, *because* you get upper and lower non-jamming limit switches. Ball bearings are used throughout and the three reductions of heat treated alloy steel gears are lubricated in a sealed bath. Capacities—¼, ½, 1 and 2 tons; mounting—lug is standard, push, hand geared and motorized trolleys are available. Voltage is reduced at the push-buttons; control is magnetic. Request Bulletin 905 from the Hoist & Crane Division of Robbins & Myers, Inc., Springfield, Ohio or Brantford, Ontario.

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Write Dept. A for Catalog 60 and new Stock List

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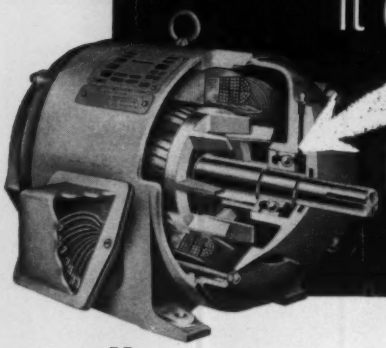
If it doesn't have it here—
it doesn't have it!
and the
BROOK MOTOR
has it!



MANY MOTORS look practically alike on the outside, but it's what is inside that counts. There is no motor with better windings or more ample bearings—few motors compare favorably. Yet, the Brook Motor costs less, because of volume production, modern techniques, distribution in 76 countries and a realistic pricing policy. Brook Motors have established excellent performance records for over 56 years in every industry using a.c. motors. From 1 to 600 H.P. Send for literature.

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BROOK MOTOR CORPORATION
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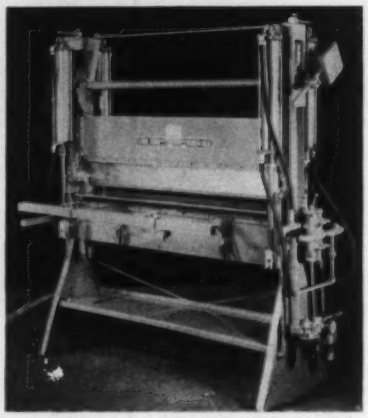
NEW PRODUCTS and equipment



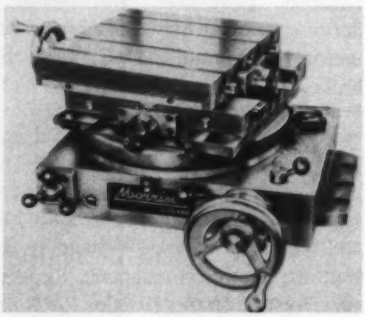
hand clamp and air operated wings. Other models (hand, air, and hydraulically operated) go up to 20 ft x ¾ in. capacity.

For angle bending to 155 degrees, a pair of wings pivot about a point off the tip of a holding blade. For radius bending, the wings travel along a curve of the desired radius.

For further information, *see* it at the ASTME show or *write* Lake Erie Machinery Corp., 500 Woodward Ave., Buffalo 17, N. Y.

Cross Slide Rotary Table Reduces Setup Time

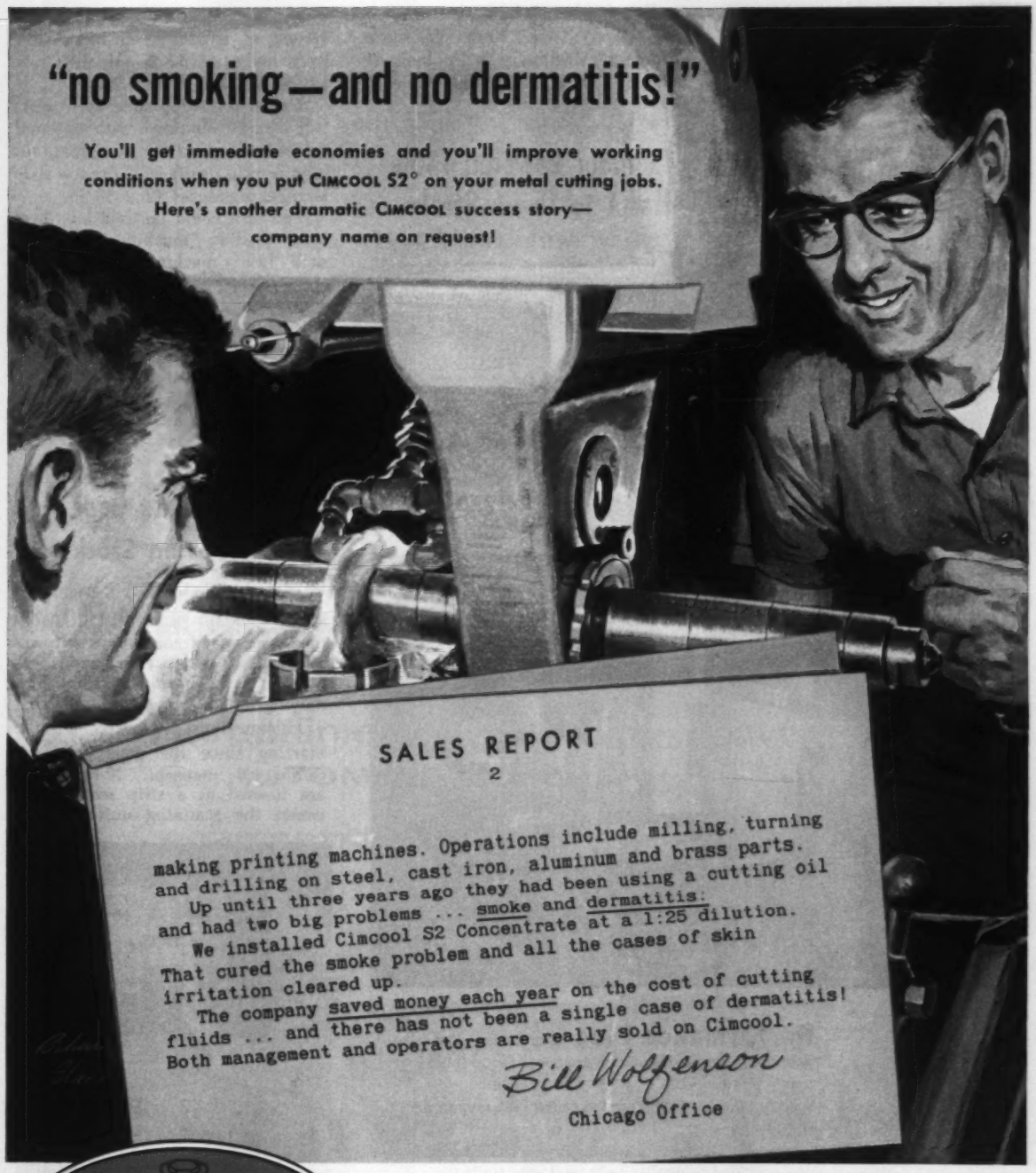
BY USING the Morrison cross slide rotary table, you can reduce setup time of stamping, forging and diecast dies, cams, templates, rubber and plastic molds, tools, gages, models, fixtures, experimental work and boring, and grinding jobs.

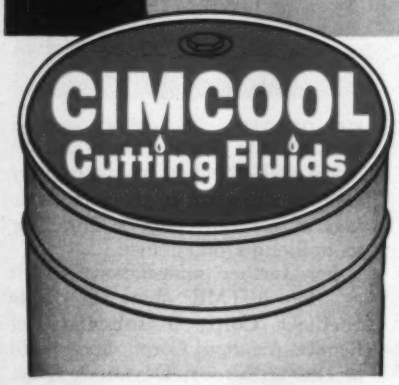


Depending on the complexity of the job, setup time savings range from 50 to 90 per cent. The company says the unit is suitable for applications using vertical milling

"no smoking—and no dermatitis!"

You'll get immediate economies and you'll improve working conditions when you put CIMCOOL S2° on your metal cutting jobs. Here's another dramatic CIMCOOL success story— company name on request!


SALES REPORT
2
making printing machines. Operations include milling, turning and drilling on steel, cast iron, aluminum and brass parts.
Up until three years ago they had been using a cutting oil and had two big problems ... smoke and dermatitis.
We installed Cimcool S2 Concentrate at a 1:25 dilution. That cured the smoke problem and all the cases of skin irritation cleared up.
The company saved money each year on the cost of cutting fluids ... and there has not been a single case of dermatitis! Both management and operators are really sold on Cimcool.
Bill Wolfenson
Chicago Office



FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL S2 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL° — Newest in the famous, industry-proven line of CIMCOOL° Cutting Fluids.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, SS) — For every job requiring an oil-base cutting fluid.
ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

°Trade Marks Reg. U. S. Pat. Off.

machines in tool and die work or in short run use.

Once located and clamped on the cross slide, it is rarely necessary to move or reclamp the part until all cuts are complete. The cross slides can be adjusted in seconds to position the work for cutting any radius with a center point within a 9 in. square area centered on the table. Dimension points are kept in exact relationship to each other.

For further information, *see* it at the ASTME show or *write* Morrison Machinery & Engineering Corp., 935 W. Lake St., Chicago 7, Ill.

Cylinder Powered Table Has 1 to 15 in. Stroke

TWO WORKING positions are provided in the indexing slide table developed by Russell T. Gilman Inc. Slide movement is powered by a 3 in. bore air cylinder or a 2 in. bore hydraulic cylinder. A system of hydraulic cushions and stops makes stroke length infinitely adjustable from 1 to 15 in.

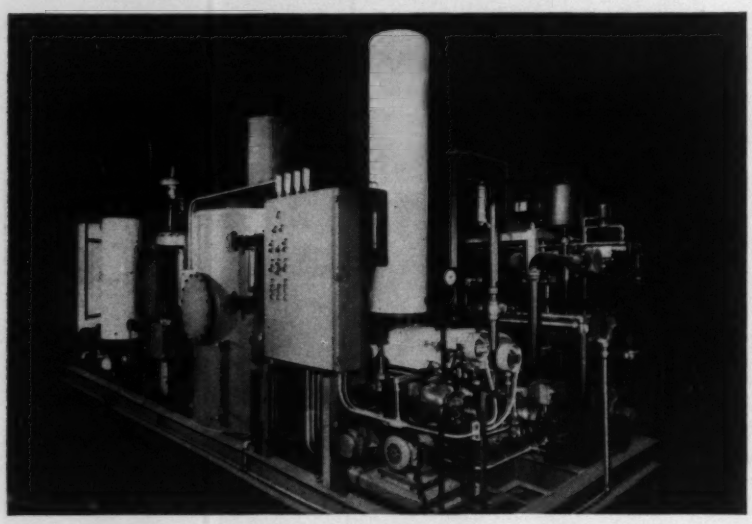
Almost any type slide cycle control can be obtained with optional valve and electrical combinations. The working surface of the top slide member measures 12 x 30 in.

The unit could be used on turret type drilling machines, multiple drill head machines, or multiple spindle boring units. The slide assembly base measures 16¾ x 34¼ in. Hold-down bolt slots are provided at each end.

For further information, *see* it at the ASTME show or *write* Russell T. Gilman Inc., 623 Beech St., Grafton, Wis.

gas Atmospheres, inc

THE NATION'S LARGEST MANUFACTURER OF PACKAGED GAS GENERATOR SYSTEMS



Performance Plus floor-saving compactness, trouble-free maintenance and "minute man" service. That's what you get when you specify Gas Atmospheres Packaged Gas Generation Systems.

You get full capacity and the dryness and purity you specified in quality-built packaged units that are set on a common base and completely factory tested prior to shipment. And, you can rely on the best factory trained service team in the business whenever your operation calls for it.

It's this kind of customer service that has made Gas Atmospheres Packaged Generators the most popular units working today. Gas Atmospheres makes a complete line of Packaged Generators for inert, CO_2, nitrogen, hydrogen, reducing and annealing gases. Literature available. Write *Gas Atmospheres, Inc., 20011 Lake Road, Cleveland, O.*

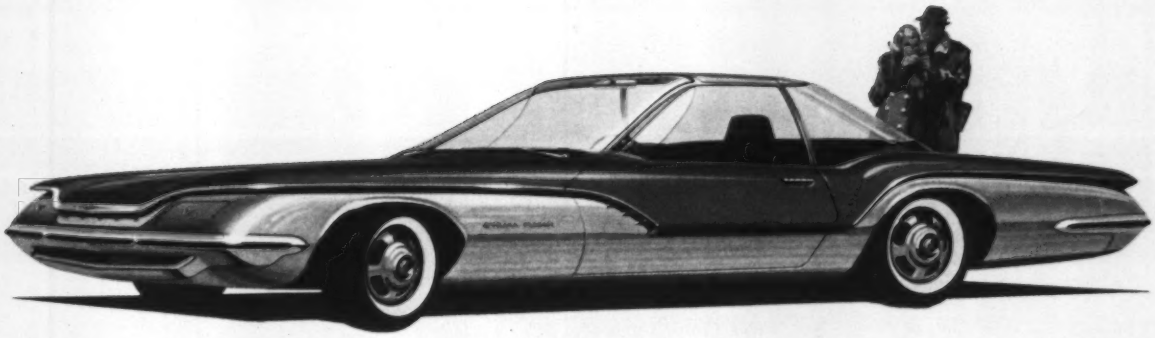
X-ray Thickness Gage Checks Moving Stock

WITH the Model 25 PT Measuray gage, you can make instantaneous measurement of continuous strips of plastic films and sheets, ferrous and nonferrous foils, and sheets and bars moving up to 6000 sfpm.

Thickness is measured without marring since the gage does not contact the material. X-ray pulses are flashed at a strip moving between the scanning unit's emitter

and receiver. The energy passing through the moving strip is detected and amplified by the receiver and the deviation is given in readings of per cent plus or minus or in millionths of an inch.

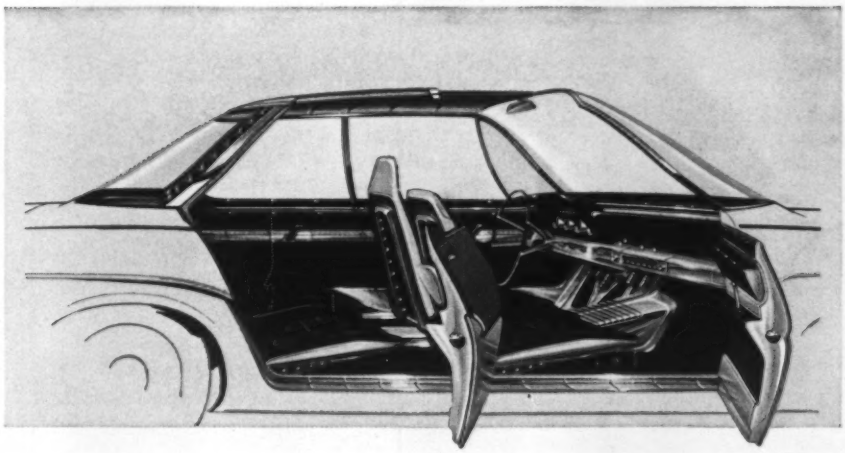
For further information, *see* it at the ASTME show or *write* Sheffield Corp., a subsidiary of Bendix Aviation Corp., Springfield & Thomas Streets, Dayton 1, Ohio.



stainless steel

No other metal has the strength, beauty and versatile qualities that serve you so well today and promise so much for tomorrow.

There is nothing like stainless steel for AUTOMOBILES



McLouth Steel Corporation,
Detroit 17, Michigan

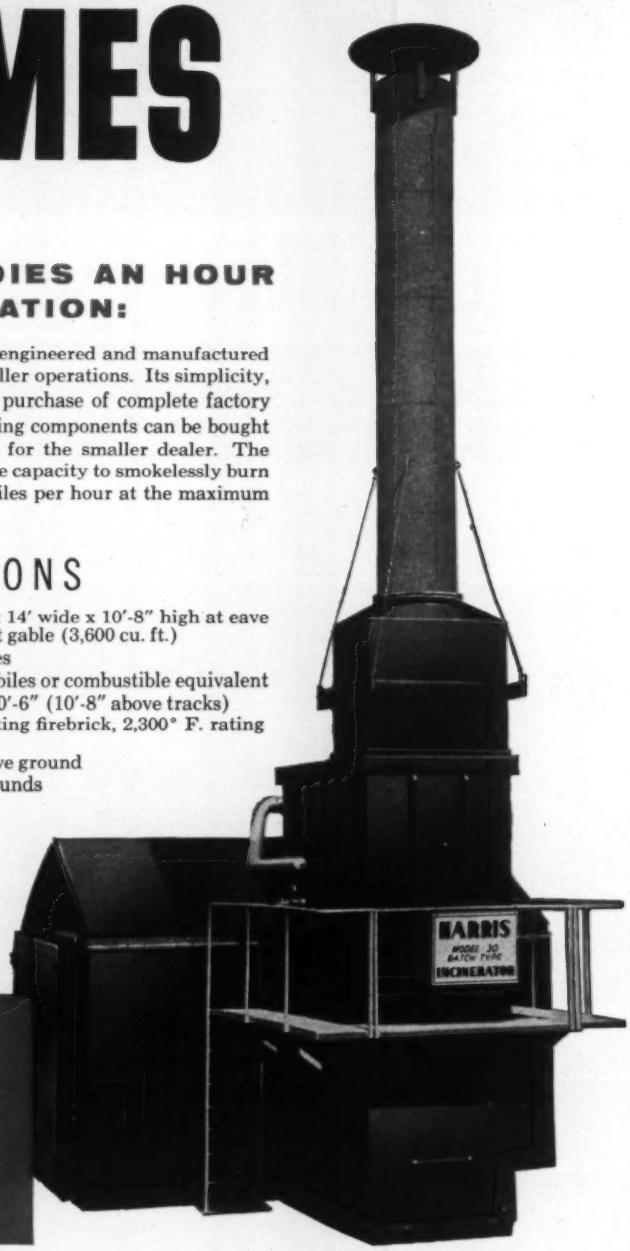
Manufacturers of high quality Stainless and Carbon Steels

Look for the **STEELMARK** on the products you buy.

McLOUTH STAINLESS STEEL

Harris Model 30 Batch Incinerator

CONTROLS SMOKE AND FUMES



HANDLES 4 AUTO-BODIES AN HOUR ...CONTINUOUS OPERATION:

This first of a complete line of incinerators being engineered and manufactured by Harris is intended to meet the needs of the smaller operations. Its simplicity, overall cost, and flexibility of installation permit purchase of complete factory built unit, or if you prefer, the major and controlling components can be bought separately. This provides an ideal arrangement for the smaller dealer. The exceptionally effective afterburner provided has the capacity to smokelessly burn all combustible matter, except tires, in 4 automobiles per hour at the maximum firing rate of 40 gallons of #2 fuel oil per hour.

SPECIFICATIONS

Kiln size	20′ long x 14′ wide x 10′-8″ high at eave 14′ at gable (3,600 cu. ft.)
Burning time	25 minutes
Hourly capacity	4 automobiles or combustible equivalent
Door openings	11′-0″ x 10′-6″ (10′-8″ above tracks)
Afterburner lining	9″ insulating firebrick, 2,300° F. rating
Stack diameter	36 inches
Stack height	35 ft. above ground
Estimated weight	55,000 pounds

Talk with a Man from Harris

HARRIS FOUNDRY & MACHINE CO.

Since 1889

CORDELE, GEORGIA

Upturn in Demand Seen by July

LOOK for an upturn in demand for the major products—sheets, bars, and plates—no later than July. The next two months will be relatively lean from a new order standpoint, but consumption will continue at a high level. That's what counts.

WORST IS OVER—Sheet producers believe they've seen the worst of the stretchouts, cutbacks, and cancellations. Automakers have trimmed their orders to the extent that second quarter production schedules warranted. (Projected output, 1.7 million cars vs. 2 million in the first quarter.) They probably have enough steel in stock or on order to round out production of their 1960 models. Continuation of the late March new car sales spurt might force restoration of some canceled tonnage, but it looks like steelmakers will have to wait until July for new automotive orders: They'll be for the 1961 models.

SHEETS STAY STRONG—In the meantime, production and shipments of flat rolled steel will be more than satisfactory. Most mills will operate close to capacity on cold rolled sheets this month. In May, production may dip to 85 or 80 per cent; in June to 75 or 70. Galvanized sheets are in somewhat tighter supply; hot rolled sheets are in a comparatively easy market.

BARS ON DOWNTREND—Like sheets, hot rolled bars are faltering. At present, they're being produced at about 85 per cent of capacity. A drop of at least 10 points is expected next month, as agricultural equipment manufacturers and other consumers live off their inventories. The turning point will come in July, when automakers start their buildups for 1961 models.

PLATE DEMAND EASING—Although some mills are making plates at about 80 per cent of capacity, lower production rates are certain for May. Reasons: 1. Users are reducing their inventories. 2. Strikes have curtailed shipbuilding demand. 3. Tankwork is far below expectations. 4. Low priced foreign plates are making serious inroads in domestic markets. January imports (50,691 tons) were nearly ten times those of January, 1959 (5114 tons).

SHIPMENTS MISS MARK—Although February finished steel shipments set a record for the month (7.6 million tons), they were nearly 500,000 tons less than expected. Normally, shipments equal 72 per cent of ingot production. In this case, they were equivalent to only 68.5 per cent of February's 11.1 million ingot tons. (It's true, of course, that some of the steel shipped in February came from January ingots, but the carryover can be disregarded.) The reason shipments were equal to only 68.5 per cent of ingot output: Steelmakers were replenishing their inventories of billets, blooms, and slabs.

INVENTORIES MOUNT—In February, domestic steel shipments and imports probably exceeded consumption by about 1.3 million tons. Adding that figure to January's estimated 2 million tons surplus of shipments over consumption, you can see that consumer inventories increased by more than 3 million tons in the first two months of the year. And here's why we couldn't maintain a 94 per cent steelmaking rate indefinitely: January-February shipments were at an annual rate of 94 million tons—about 16 million tons more than U. S. consumers have ever used in a year.

INGOT RATE DROPS—Easter holidays, a wildcat strike, and planned cutbacks dealt steel production a sharp blow last week. The ingot rate fell 4.4 points to 79.9 per cent of capacity. Output: About 2,277,000 ingot tons.

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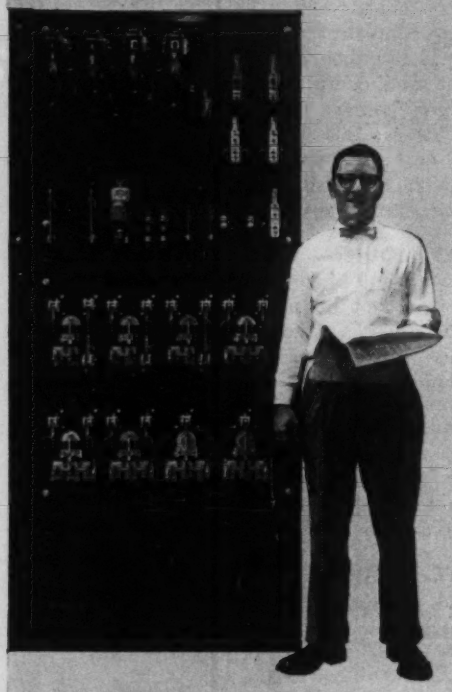
*Current prices were published in the Apr. 11 issue and will appear in subsequent issues.

"Reliance's mill-type control does the thinking...this unique cold mill does the rest.



R. M. Bosshardt, Manager,
Heavy Duty Metal Rolling Section,
Reliance Electric & Engineering Co.

"The terms 'precision' and 'versatility', as applied by the makers of this new 'Pittsburgh' 4/high-2/high combination cold mill, also exactly describe the Reliance mill-type heavy industry control. Smooth functioning and easily maintained, this control is slate mounted for safety and quick accessibility.

"The mill itself in 4/high is used for cold reducing; in 2/high, it tempers and finishes. A 250 hp. Reliance D-c. mill motor is coupled to a gear reducer which drives 2 output shafts which can be applied to either set of rolls depending on the operation. Utilization of full motor speed range produces a maximum of 300 feet per minute on 8" or 20" rolls. The reel is driven by a 100 hp. D-c. motor with two VSR regulators: one to match speed of the mill, the other to maintain tension. Reel is automatically changed . . . and an all-electric control quickly recalibrates reel drive system for either 2/high or 4/high."

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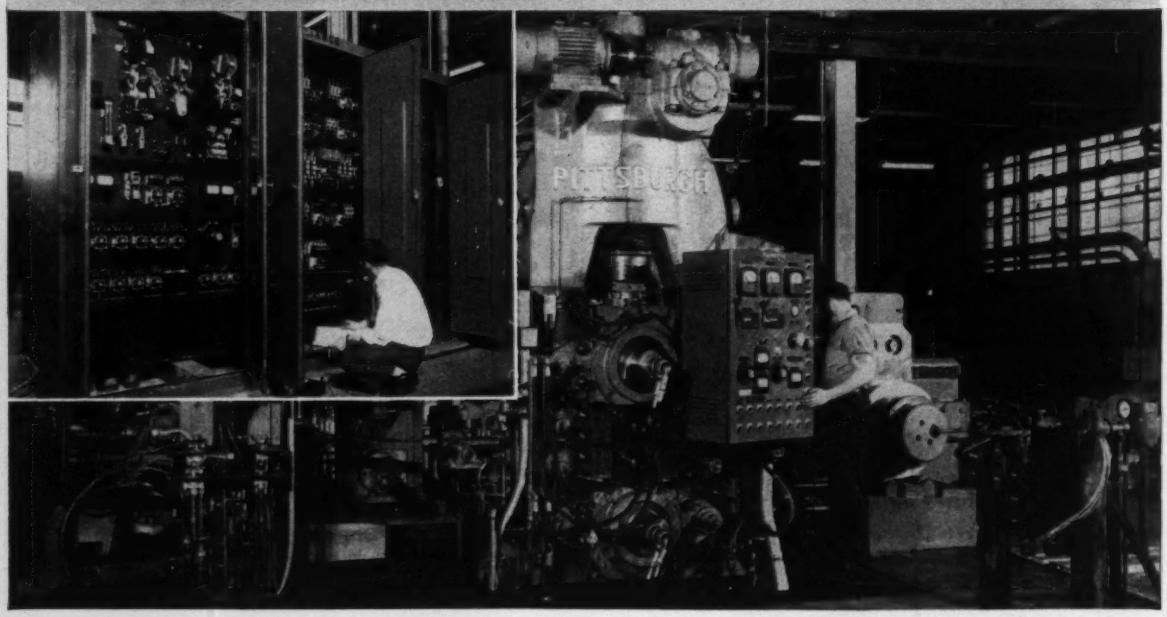


Manufacturers' Wire Headed for Good Year

ALTHOUGH current sales are sluggish, you can expect near-record shipments of manufacturers' wire this year. Leading producers believe the industry's output will jump 10 per cent—from 2.7 million to 3 million tons.

There's an outside chance that a new high will be reached. If shipments continue at the January-February pace, 27.5 per cent ahead of last year's figures, they'll top 1955's 3.2 million tons by a wide margin. In this year's first two months, industry shipments were 560,832 tons (vs. 439,204 tons in the like period of 1959).

• **Odds Against Record**—Impressive as January-February shipments were, they represented only 3.5 per cent of the total steel outturn for those months. On an annual basis, that's not high enough for a record. If 1960 ingot production reaches 120 million tons and finished steel shipments hit 85.5 million tons—which is the best that can be expected now—the drawn wire outturn will be 3 million tons.

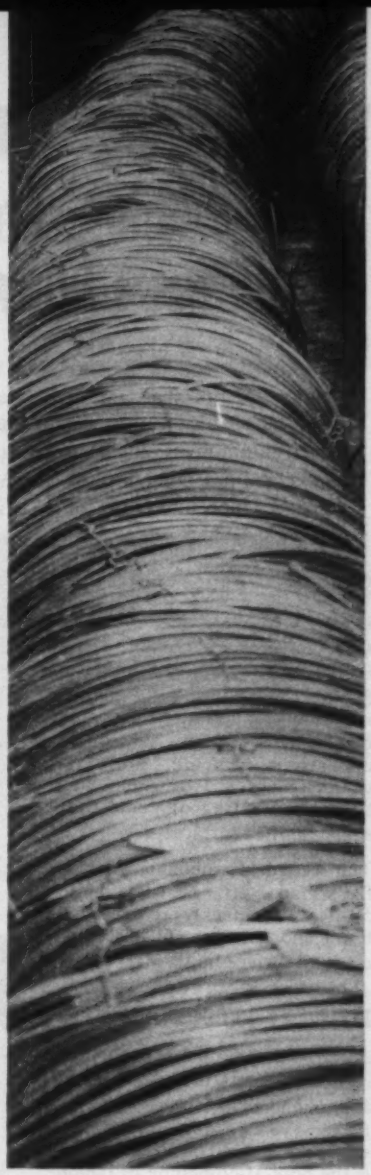
Other factors weighing heavily against a record year are these: 1. Sales to the automotive industry (normally equivalent to 7 or 8 per cent of manufacturers' wire shipments) will be smaller than they were in 1955, when an unprecedented 7.9 million cars were built. 2. Shipments to fastener manufacturers—big suppliers to the automotive and appliance industries—will be smaller than they were in 1955. 3. Foreign steelmakers will make greater inroads in the domestic market for manufacturers' wire and will capture an even larger share of the market for merchant wire products, many of which are made from manufacturers' wire.

• **Inventory Indigestion**—By all indications, the first half will be the reverse of last year's first half. This year, business began with a boom, then started tapering off. First quarter shipments of many wiremakers were 15 to 25 per cent greater than last year's, reflecting heavy demand from users who were hedging against the threat of a renewed strike, or replenishing depleted stocks in anticipation of better business. When the labor crisis was resolved (thus assuring continuity of supply) and sales fell short of rosy predictions, buyers decided to buy no more until they had digested their inventories. Result: Orders from converters, wire form producers, furniture manufacturers, fastener suppliers, automakers, and machinery builders dropped sharply in February and March. Tonnage booked previously was held up, cut back, or canceled.

In the battle for new orders, most of the business is going to suppliers who can promise fast delivery. While some wiremakers start with rods, others try to get a competitive edge by rolling to process sizes that will be ready for further reduction as soon as an order comes in. Most producers can ship low carbon wire within two weeks, grades that require heat treating in four or five weeks.

• **Upturn Sighted**—"After a three week pattern of declining orders, industrial wire bookings have started to turn upward," says a leading Midwestern producer. Most of the water has been wrung out of automotive orders and further cutbacks look unlikely—particularly in view of the late March sales spurt for new cars. Upholstery spring wire is starting upward as furniture manufacturers plan production of new lines they'll introduce in August. Demand from producers of welded reinforcing fabric is picking up seasonally.

• **Import Threat Growing** — To date, foreign competition hasn't been much of a threat to American



Banner Year Forecast for Drawn Wire Shipments

(Net tons)

1960	3,000,000*
1959	2,725,598
1958	2,362,887
1957	2,598,390
1956	2,988,377
1955	3,192,678

*Estimated by STEEL.

WHY

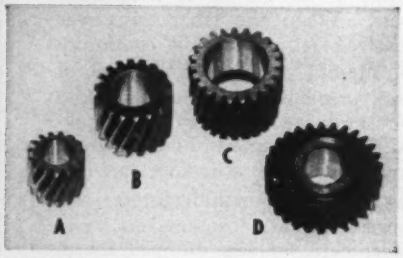
Microhoning* Transmission Gears Simplifies & Improves Production

Improved product performance and simplified processing – two major factors that are accelerating the swing to Microhoning. Typical of this swing is a major manufacturer of regular and compact automobiles. In the processing of gears for automatic transmissions, this company selected Microhoning for a number of flat surfaces, bores and O.D. of a housing hub—HERE'S WHY!

SIMPLIFIES PROCESSING

Double surface Microflat machines simultaneously Microhone both flat surfaces of pinion and sun gears–first, to obtain proper thickness and parallelism on soft gear blanks. This simplifies subsequent operations (boring, hobbing, chamferring, etc.) by eliminating former orienting of gears to a single finished surface.

The second Microhoning of these flat surfaces, after heat-treating to 59 R "C", quickly removes all burrs and generates final accuracies and surface finish.



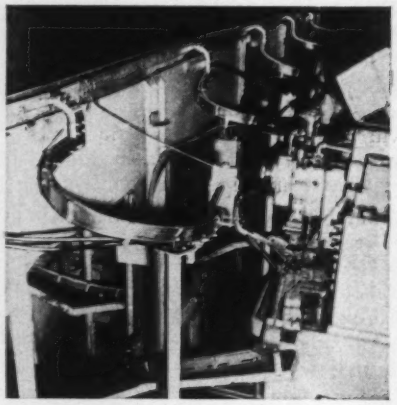
"A"–pinion gear for large transmission "B", "C" & "D"–pinion and sun gears for compact car transmission

EFFICIENT PRODUCTION

After the second flat-Microhoning operation, gears are conveyed to Microhoners for processing the bores. Typical, of the production efficiency realized on all gear bores, is the bore-Microhoning of pinion gears (nine are used in each large transmission).

On eight Microhoners these pinion gears are automatically loaded, positioned, bores Microhoned, checked for size, segregated and ejected (see photo to right). This wholly automatic sequence takes about 18 seconds per gear. Only one set up man is required to keep all eight machines in operation.

An average of .002" stock is removed from each bore; generated surface finish is 10 microinches, rms; roundness and straightness are held within .0001" tolerance; diameter within .0003". Comparable results are obtained on other gear bores (see facing page).



This efficient precision production assures consistent results. Also, reliable precision on component parts is a prime answer to "Why" better performing automatic transmissions are obtained.

*Registered U.S. Pat. Off.

PRECISION PRODUCTION THROUGH MICROHONING

MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

producers of manufacturers' wire. Reasons: 1. European mills have relatively high production costs, so profit margins haven't been attractive to importers. 2. Foreign producers haven't provided the technical and metallurgical service that U. S. consumers expect. 3. Buyers are reluctant to gamble on untried sources for wire that must meet their specifications exactly.

In spite of those obstacles, foreign mills are landing significant tonnages of some specialties and low carbon wire at East Coast, Gulf, and Great Lakes ports. "Foreign competition is getting to be more of a factor," warns H. B. Johnson, president of Atlantic Steel Co., Atlanta. Examples: 1. Large quantities of imported box binding and stapling wire are being used by Florida fruit packers. 2. A big integrated steelmaker can no longer stay competitive in Florida by drawing its own rods (shipped from the north) into wire. It's buying foreign rods. 3. The clothespin industry is using 3000 tons of galvanized wire annually, all imported.

Wire . . .

Wire Prices, Pages 177 & 178

Deliveries of manufacturers' wire fall early in May, and on merchant wire tonnage can be had from stock in many cases. There is little competition from abroad on manufacturers' wire, but plenty on the merchant items, particularly barbed wire and nails.

The slump in demand for wire products, both manufacturers' and merchant grades, is prompting a reduction in operations at some plants of American Steel & Wire Div., U. S. Steel Corp.—in Joliet, Waukegan, and North Chicago, Ill., and Duluth, Minn.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 176 & 177

Sheetmakers think the worst of the stretchout, cutbacks, and cancellations is over. Auto builders have trimmed their orders to a degree consistent with their second quarter assembly plans: 1.7 million cars vs. 2 million in the first three months of the year. It's thought they have enough steel in stock and on order to round out production of 1960 models. Continuation of

the late March new car sales spurt may bring them back into the market for additional steel tonnage.

With most of the water out of the automotive bookings, sheet mill April orders for cold rolled look reasonably firm. Most mills will operate close to capacity this month. In May, production may taper off to 85 or 80 per cent of capacity. In June, operations may drop even lower, but no one knows to just what level. When the June leadtime passed (Apr. 15), some mills were only half booked up. Anxious to get more tonnage, they're ready to stretch the leadtime a bit beyond the normal cutoff date.

Generally, business in hot rolled sheets is slow, with early May deliveries possible. Significantly, Western European producers have virtually withdrawn from the market in the East on hot rolled. They had withdrawn on cold rolled sheets some time ago, having participated only temporarily in the market due to the strike emergency. Domestic mills are promising late May shipments on cold rolled, and are fairly well booked up for the quarter on galvanized sheets.

Distributors . . .

Prices, Page 180

Demand on the steel service centers continues disappointing. Volume was expected to increase seasonally this month, but so far the distributors report there has been little change from March. In some instances, tonnage is off. In general, though, business is regarded as moderately good.

Stocks are well balanced in virtually all products, including hot and cold rolled sheets. That means the distributors are in position to fill customers' requirements promptly. With consumers tending to order largely against needs, some business that ordinarily would go to the mills may be diverted to the service centers.

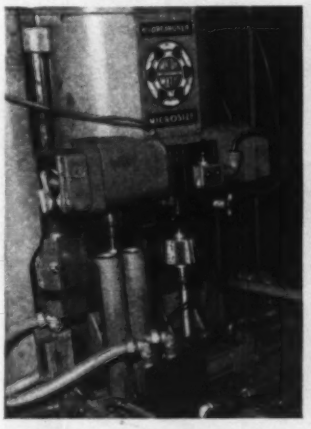
Some lowering of prices to meet the competition from low-priced foreign steel has been reported at coastal points. Otherwise, except for some price shading reported on secondary flat-rolled items in the Midwest, the market is steady.

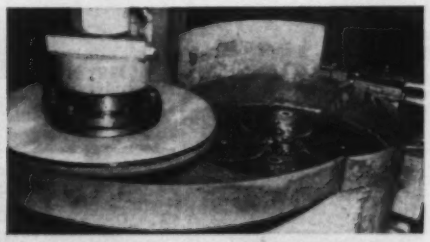
It's now estimated 1960 steel service center sales will run 10 to 15 per cent higher than 1959 volume. April likely will fall below

HOW

Microhoning* Transmission Gears Simplifies & Improves Production

A major manufacturer of regular and compact cars has selected Microhoning as the most efficient method for securing consistent precision, controlled surface finishes, and simplified processing. Microhoning is used on the flat surfaces and bores of a number of transmission gears plus the O.D. of a housing hub. **HERE'S HOW!**





Flat-Microhoning small transmission gears—head is swung to left for easy loading.

Bore-Microhoning—both spindles fed simultaneously.

FLAT-MICROHONING

Both faces of a variety of transmission gears are simultaneously Microhoned. First, soft gear blanks are flat-Microhoned to secure proper thickness and parallelism within .0003", and a finish of 30 microinches (rms) or better. This simplifies subsequent processing by eliminating formerly required orienting of part to only one finished face.

The second flat-Microhoning of faces, after heat-treating to 59 R "C", quickly cleans up all burrs while generating final accuracies and finishes.

BORE-MICROHONING

The Microhoning of bores for large transmissions is described on facing page. The smaller transmission uses pinion and sun gears having various bore sizes (.697"D. x 3/4"L., .697"D. x 1-3/32"L., 1.030"D. x 7/8"L.).

To generate roundness, straightness, size and surface finish, these bores are processed on double-spindle Microhoners equipped with shuttle-type fixturing. Straightness and roundness are held within a .0003" tolerance, diametric size within .0005". All gear bores are processed in an average 26-second cycle that includes loading, Microhoning and ejection.

O.D.-MICROHONING

The converter housing hub of the large transmission is also Microhoned. Hub O.D. is 1.936", length is about 2", and it has a blind end with 1/4" relief. Two progressive Microhoning operations remove a total of about .004" stock to generate a surface finish of 15 microinches in a cycle time of 45 seconds per part. Special Microhoning technique generates circumferential lay on hub O.D. to provide compatibility between it and oil seal rotation. *This increases seal life and effectiveness.*

*Registered U.S. Pat. Off.

PRECISION PRODUCTION THROUGH MICROHONING MICRO MATIC

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the showing of April a year ago, since last year a pickup was starting at this time. Sheets are now the strongest item in warehouse sales.

The service centers hope for a second quarter that will exceed the first three months. Reasons: Better weather and a seasonal upswing in construction. Further, it's thought consumers are well along on their inventory adjustments. Third quarter is likely to fall below second, largely for seasonal reasons. The prediction then is for a rise starting in September, continuing through fourth quarter.

A favorable omen is that demand and supply have been coming closer together the last two months. Some warehouse buyers still can't get all products they want from the mills, particularly sheets. Average warehouse orders normally are around 2000 lb—currently they are closer to 1200 lb. Inventories are long on plates, shapes, and bars. They are satisfactory in cold finished bars.

WAPAK SLITTERS

Photo courtesy of Stamco Inc., New Bremen, Ohio

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Tubular Goods . . .

Tubular Goods Prices, Page 179

Commercial steel pipe is readily available for delivery within three to four weeks. However, pipe distributors are moving tonnage at a little better rate, so deliveries may lengthen over coming weeks.

Line pipe producers are enthusiastic about the Canadian government's decision authorizing the export of natural gas. The way has been cleared for initial work on several projects that will require thousands of tons of line pipe. One of the first (already approved by the Federal Power Commission) will be a 504 mile, 24 in. line from the Canadian border at Emerson, Man., to Marshfield, Wis. It's being built by Midwestern Gas Transmission Co.

Although tubemakers still have tonnage to ship, they say demand for most products is "lousy." Oil country goods remain depressed, with almost no requirement for drill pipe. One producer booked only 20 per cent of its drill pipe capacity last month. By comparison, the market for standard pipe is fairly good. But here, too, current sales leave much to be desired. Users have rebuilt their inventories and bad weather has retarded consumption. A leading producer sold only 50 per cent of its acceptance limit for March.

Stepped-up drilling in Texas helped generate a sharp increase in the number of rotary rigs operating in the week ended Apr. 4. Hughes Tool Co.'s survey showed 1746 rigs operating, an increase of 67 for the week. A year ago, the count was 2037. Improved weather has allowed some major producing areas to dry out, resulting in a surge in well operations.

The large diameter pipe mill of Republic Steel Corp. at Gadsden, Ala., reopened last week after being down six weeks for lack of orders. Additional open hearths will be put in operation. Several orders on the mill's books have been held up for lack of Federal Power Commission clearance on proposed pipelines. The mill is now working on an order for 24 in. pipe to be delivered to Wisconsin. That will keep it operating eight to ten weeks.

National Tube Div., U. S. Steel Corp., is shipping from its McKeesport, Pa., Works, the first seamless

pipe for the newest major natural gas pipeline. It will run 1750 miles, from Eunice, N. Mex., to Minneapolis, Minn. The mill will complete its portion of the $71.6 million project about June 1. Pipe for Mid-America Pipeline Co., Tulsa, Okla., will move propane, butane and natural gasoline from West Texas, New Mexico, and the Texas panhandle to McPherson, Kans. From Kansas, branches go north—one to Madison, Wis., and the other to Minneapolis-St. Paul.

Bethlehem Steel Co. last week started shipments of pipe for the Mid-America project. It is one of the company's largest single orders for a specific size and grade of electric resistance weld pipe. The first of the shipments was about 1000 tons. Similar shipments of the 8⅝ in. pipe will be made over the next month. The pipe is destined for that portion of the line between McPherson, Kans., and central Missouri.

Large steel storage facilities will be erected at McPherson. Initial capacity will deliver 50,000 barrels per day of natural gas liquids to McPherson, and 60,000 barrels per day from storage facilities there to northern distribution points.

Standard Oil Co. of California and Western Operations Inc. plan a 20 mile common carrier crude oil pipeline and marine terminal facilities on Alaska's Kenia Peninsula.

Pig Iron . . .

Pig Iron Prices, Page 180

Merchant pig iron supplies have been more than ample for current requirements for some time. There is little prospect of a pickup in demand that would put the blast furnaces under pressure for shipments.

Iron is scheduled to move out of Buffalo harbor for upper lake ports just as soon as lake navigation permits. Several shipments of merchant iron to Detroit consumers have been booked. Shippers say the movement from Buffalo may be lighter this season unless there is a pickup of activity at foundries serving the auto industry.

Despite the sluggish merchant iron demand, and slackening of steelmaking operations, blast furnace operations have been only slightly affected. It's reported, however, that continued slackening of steel production will necessitate the banking of some blast furnaces soon.

Rails, Cars . . .

Track Material Prices, Page 178

The Bessemer (Ala.) plant of Pullman-Standard Div., Pullman Inc., which only a week ago completed a 750 car order for aluminum flat-bottom gondolas for the Southern Railway System, has started work on a $12 million order for 2600 cars from the Louisville & Nashville Railroad. The plant opened a second production line last week to fill a $5 million order for 400 boxcars from the St. Louis & San Francisco Railroad.

Employment is being increased to 1700, reports J. E. Bolen, works manager. The Frisco order is expected to be completed about May 15, with deliveries running at the rate of about 20 cars a day from Apr. 18.

Tool Steel . . .

Tool Steel Prices, Page 179

Shipments of tool steels (excluding hollow drill steel) in February

New Catalog Describes Latest Developments in Waste and Refuse Storage and Removal

New Techniques Cut Cubic Yard Removal Costs to Record Low

This new 28-page color catalog describes remarkable new developments in waste control and disposal that have, within the last two years, obsoleted many systems now in use. Cubic yard handling costs have been reduced to a point where many firms and municipalities are saving thousands of dollars annually that they were previously spending to operate old-style equipment.

Materials handling and waste disposal are two of the few areas of large potential cost reduction remaining in manufacturing and municipal administration. This new catalog has a bearing on both of these areas of operation.

To get your copy of this new fact-filled catalog, write today.

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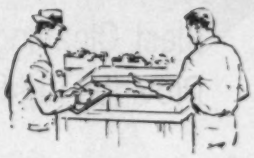

Dempster Field Engineers, located in all sections of the country, make thousands of cost-finding refuse storage and collection surveys every year, without cost or obligation. If you would like to know your disposal costs, and what—if any—avenues of improvement exist, write today on your letterhead.

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totaled 9660 net tons, bringing the movement for the year to 19,237 tons, reports the American Iron & Steel Institute. In February, 1959, the movement was 7646 tons, and for the first two months of the year it was 15,191 tons.

The February tonnage was the largest reported for any month since June, 1959, when 12,032 tons were moved.

February Steel Shipments Set Record for Month

Steel product shipments came to 7,583,033 net tons in February, a high for the month. The former record: 7,468,393 tons in 1956. In February, 1959, shipments were 6,524,374 net tons, but the month had one less shipping day.

Principal products shipped in February included: Cold rolled sheets, 1,446,580 net tons; hot rolled sheets, 911,927 tons; hot rolled bars (including light shapes), 841,841; plates, 726,612; and heavy structural shapes, 524,778.

The major market classifications to which steel was shipped direct

Shipments of Steel Products—February, 1960

(Net tons)

Products	Carbon	Alloy	Stainless	Two Months Ending Feb. 1960	Feb. 1959
Ingots, etc.	22,609	9,955	2,561	92,112	42,556
Blooms, etc.	117,187	50,689	1,390	389,307	259,809
Tube rounds	905	481	....	3,768	3,398
Skelp	26,599	1	....	29,387	11,031
Wire rods	113,491	3,552	1,301	249,510	201,223
Structurals	515,412	9,361	5	1,098,703	716,386
Steel piling	37,240	1	....	83,550	54,410
Plates	653,592	68,719	4,301	1,496,546	1,066,975
Rails (standard)	77,059	.....	....	177,479	125,927
Rails (other)	3,783	.....	....	9,143	6,652
Joint bars	2,801	.....	....	6,007	5,304
Tie plates	13,297	.....	....	30,850	23,424
Track spikes	3,901	.....	....	9,323	7,719
Wheels	25,469	14	....	51,994	30,054
Axles	12,292	51	....	25,958	11,610
Bars—HR	642,132	195,924	3,785	1,721,686	1,279,540
Bars—reinforcing	139,709	.....	....	324,734	275,550
Bars—CF	131,491	28,926	5,529	337,899	255,527
Tool steel	1,376	8,284	....	19,237	15,191
Standard pipe	252,322	115	....	544,125	372,615
Oil country	120,275	40,748	....	365,934	375,635
Line pipe	234,235	47	....	517,020	448,925
Mech. tubing	67,762	25,492	413	191,442	138,581
Pressure tubing	18,268	4,101	1,400	50,614	49,059
Wire—drawn	245,955	5,021	2,985	560,832	439,204
Nails & staples	34,448	.....	3	76,978	61,202
Barbed wire	3,912	.....	....	8,604	8,694
Woven fence	10,238	.....	....	22,554	25,007
Bale ties, etc.	2,950	.....	....	7,635	13,324
Black plate	54,980	.....	....	116,728	109,219
Tin plate—HD	29,385	.....	....	61,872	54,906
Tin plate—electro	443,619	.....	....	937,387	859,835
Sheets—HR	874,683	33,429	3,815	1,907,430	1,514,706
Sheets—CR	1,424,925	6,910	14,745	3,041,157	2,668,486
Sheets—galv.	289,583	6	....	612,780	560,881
Sheets—coated	23,754	.....	....	52,936	52,452
Elec. sheets	6,973	66,449	....	143,862	107,632
Strip—HR	142,188	2,937	882	305,065	233,406
Strip—CR	134,191	1,922	21,782	320,388	224,438
Total (1960)	6,954,991	563,135	64,907	16,002,536	.....
Total (1959)	6,056,969	413,300	54,105	.....	12,710,493

Data from American Iron & Steel Institute.

EXECUTIVE REPORT #9

THEY BLAST BRIDGES BEFORE THEY'RE BUILT

Blast Cleaning Structural Steel Provides Big Savings

Prominent structural steel fabricating plants now blast clean all shapes and sizes of structural steel channels, angles, plates, bar and rod stock—in Wheelabrator cabinets.

The straight-line production made possible by Wheelabrator airless blast cleaning has improved manufacturing efficiency and reduced their cleaning costs substantially. And the shot-blasted finish has proven to be ideal for lasting surface protection of the finished structural members.

Wheelabrator's unequaled experience in descaling structural steel is at your service. Send for new informative bulletin No. 152-D. Write to Wheelabrator Corp., 509 S. Byrkit Street, Mishawaka, Ind. In Canada, P. O. Box 490 Scarborough, Ont.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

from the mills during the month included: Automotive, 1,739,551 tons; warehouses and distributors, 1,393,154; construction (including maintenance), 879,196; containers, 600,666; and machinery, industrial equipment, and tools, 449,962.

Foreign Competition Is Getting Stiffer

Pacific Northwest steelmakers last week were reported considering reducing quantity extras on reinforcing bars as a move to meet increasing foreign competition. Base prices would remain unchanged.

Imports have been increasingly competitive in Oregon, but sellers in the Seattle area say foreign tonage at that point has been only half that entering the country at Portland, Oreg.

In excess of 88,000 tons are reported to have been imported at Portland, of which 10,000 tons were reinforcing bars. In 1958, imports included only 4000 tons of bars. Seattle steel imports in 1959 were 52,000 tons, including 3800 tons of reinforcing bars. In 1958, bar imports totaled only 496 tons.

Reports from Alaska are that a second steel importing firm is to establish warehouse and other facilities to handle foreign steel. A church in Alaska will use 60 tons of Japanese bars in building an addition.

General Construction Co., Seattle, has the general contract for an apron and deep sea terminal for the Port of Seattle. The job involves 620 tons of reinforcing bars which have been placed with the Pacific Coast Div., Bethlehem Steel Co., Seattle, and Soule Steel Co., Seattle. However, 720 tons of steel sheet piling will come from Belgium, purchased through the Emerlux Steel Co. This material, it's said, can be delivered at Pacific Coast tidewater ports at about $150 a ton compared with $190 on domestic steel.

While no recent price reductions have been reported on foreign mill steel in the Southwest, there are indications there that a new round of lower prices will be announced soon. One Houston consumer told of a direct offer from an Antwerp broker who quoted prices sharply below current foreign mill levels, which range from $20 to $25 a ton under domestic mill prices.

Prices on deformed reinforcing bars from Western Continental Europe have dropped 5 cents per 100 lb. New prices at North Atlantic ports are now $5.90; Great Lakes $5.95; South Atlantic $5.80; Gulf Coast $5.65; and West Coast $6.05. Prices on other major products are weak but unchanged.

The import market on hot rolled sheets in this country has slowed to the extent that most Western European producers have withdrawn all quotations.

Steel Bars . . .

Bar Prices, Page 175

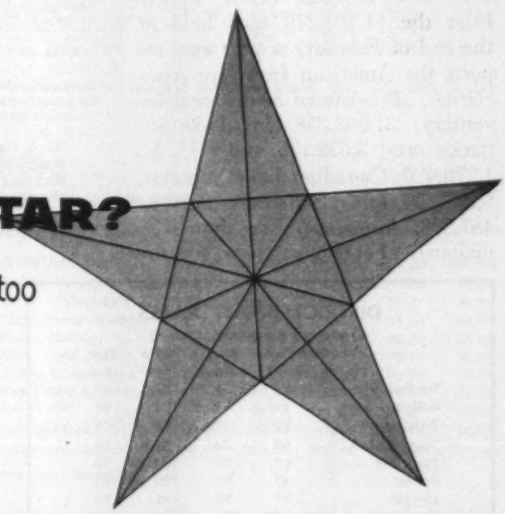
Shipments of hot rolled carbon steel bar against new orders can be had in early May. Recently, the heavier sizes have been in better demand than the lighter ones, but this situation appears to have come into balance.

The hot mills report a definite slowing down in demand from the cold drawers, who appear to have built up inventories to the highest point since last summer. Some

EXECUTIVE REPORT #16

HOW MANY TRIANGLES* CAN YOU FIND IN THIS STAR?

Look for the hidden value in blast cleaning abrasives, too



The "hidden values" you get in a high quality steel abrasive, like Wheelabrator Steel Shot, far outweigh any price advantage of the so-called "economy" abrasives. Wheelabrator Steel Shot is harder and tougher — lives for many more cycles through your blast equipment. It cleans better — allows shorter blast cycles. You'll get better, faster cleaning, lower maintenance, lower actual cleaning costs with top quality Wheelabrator Steel Shot. Thousands of users do. Your Wheelabrator Abrasive Engineer will prove it.

Write today for this new handbook of blast cleaning abrasive performance, full of charts and facts to help you control abrasive consumption and reduce cleaning costs. Write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, Wheelabrator Corp., Canadian Div., P.O. Box 490, Scarborough, Ontario.

WHEELABRATOR
STEEL ABRASIVES

If you examine it closely enough, you'll find 97 triangles.

fastener manufacturers also have built up substantial stocks, and are now specifying lightly.

In alloys, both hot and cold, the lag in automotive demand is having a depressing effect on the market.

Producers of alloy specialties have accumulated heavier stocks of billets and are slowing semifinished production, including electric furnace operations.

While there are openings in May mill schedules, consumption is holding up reasonably well—the bottom hasn't fallen out of the market. April-June shipments, however, may decline about 15 per cent from the first quarter level.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 176

Demand for concrete reinforcing bars is seasonally heavier. A good volume of public work is developing, particularly roads, bridges, and large engineering projects. Some distributor-fabricators have large backlogs but are meeting delivery promises.

Iron Ore . . .

Iron Ore Prices, Page 181

Stocks of iron ore in the U. S. at the end of February totaled 48,396,749 gross tons, down slightly from the 51,702,279 tons held at the end of February a year ago, reports the American Iron Ore Association. Breakdown of the total inventory: 21,062,258 tons, Lake Superior ores; 3,639,129, other U. S.; 1,270,430, Canadian Lake Superior; 5,957,334, other Canadian; and 16,467,598, foreign (other than Canadian). For comparisons, see the accompanying table.

Consumption of ore in the U. S. during the month totaled 11,337,345 gross tons, bringing the total for the first two months of the year to 23,193,294 tons. In February, 1959, consumption was 9,706,518 tons, and the two months' total was 19,538,359 tons. For details, see the accompanying table.

The first iron ore cargo from the head of the lakes to arrive at a Lake Erie port in the 1960 shipping season was unloaded at Lorain, Ohio, last week. The *Thomas S. Cole* of the Pittsburgh Steamship Div. (U. S. Steel), discharged 10,000 tons at that port for use by the National Tube Div. of the corporation.

Iron Ore Statistics—February, 1960

Iron Ore in Inventory—February, 1960
(Gross tons)

	U. S. Ores		Canadian Ores		Foreign	
At U. S. Furnaces	L. Sup.	Other	L. Sup.	Other	Ores	Total
Beginning of Month	24,651,447	3,689,074	1,393,615	5,227,996	14,427,003	49,389,135
Mass., N. Y.	1,795,295	47,672	61,780	155,022	306,252	2,366,021
Pennsylvania	4,859,381	309,485	27,812	405,666	6,242,137	11,844,481
Maryland, Vargina, W. Virginia	177,676	8,404	32,529	1,562,759	2,525,327	4,306,695
Kentucky, Tennessee, Texas	225,353	278,775	.....	248,433	139,908	892,469
Alabama	871	1,792,243	.....	129,208	3,352,910	5,275,232
Ohio	4,225,600	70,217	545,894	1,461,535	1,087,650	7,390,896
Indiana	3,676,849	8,121	278,787	.....	76,331	4,040,088
Illinois	2,525,958	11,313	21,422	.....	203,192	2,761,885
Michigan, Minnesota	1,946,400	.....	116,104	243,696	173,309	2,479,509
Colorado, Utah, California	.....	1,109,588	.....	.....	11,366	1,120,954
Undistributed	733	3,311	.....	.....	422	4,466
Total—End of Month	19,434,116	3,639,129	1,084,328	4,206,319	14,118,804	42,482,696
At U. S. Docks	1,628,142	.....	186,102	1,751,015	2,348,794	5,914,053
Total U. S. Inventory	21,062,258	3,639,129	1,270,430	5,957,334	16,467,598	48,396,749
At Canada Furnaces:						
Beginning of Month	1,284,247	.....	233,694	784,113	39,533	2,341,587
End of Month Total	1,085,389	.....	194,624	581,760	27,688	1,889,461
Total U. S. & Canada	22,147,647	3,639,129	1,465,054	6,539,094	16,495,286	50,286,210

Consumption of Iron Ore in February, 1960
(Gross tons)

	U. S. Ores		Canadian Ores		Foreign	
In U. S.:	L. Sup.	Other	L. Sup.	Other	Ores	Total
Mass., New York	473,197	77,161	26,514	82,005	55,188	714,065
Pennsylvania	1,197,354	234,001	594	171,927	1,258,229	2,862,105
Maryland, Virginia, W. Virginia	73,404	40,023	9,064	295,231	545,673	963,395
Kentucky, Tennessee, Texas	29,528	79,801	.....	54,662	44,202	208,193
Alabama	.....	477,756	.....	.....	231,719	709,475
Ohio	1,220,470	45,230	151,779	362,261	328,368	2,108,108
Indiana	1,136,086	18,971	163,872	.....	24,161	1,343,090
Illinois	973,560	23,757	9,545	.....	65,550	1,072,412
Michigan, Minnesota	444,562	.....	73,980	152,690	55,037	726,269
Colorado, Utah, California	.....	619,579	.....	.....	10,208	629,787
Undistributed	112	316	.....	.....	18	446
In U. S.:						
Blast furnaces	3,870,723	984,417	349,468	648,779	1,039,347	6,892,734
Steel furnaces	166,832	78,084	7,123	6,271	602,391	860,701
Sintering	1,510,621	551,848	78,757	461,401	973,180	3,575,807
Miscellaneous	97	2,246	.....	2,325	3,435	8,103
Total U. S.	5,548,273	1,616,595	435,348	1,118,776	2,618,353	11,337,345
Total Canada	198,858	.....	104,239	233,651	11,845	548,593
Total U. S. & Canada	5,747,131	1,616,595	539,587	1,352,427	2,630,198	11,885,938

Data from American Iron Ore Association.

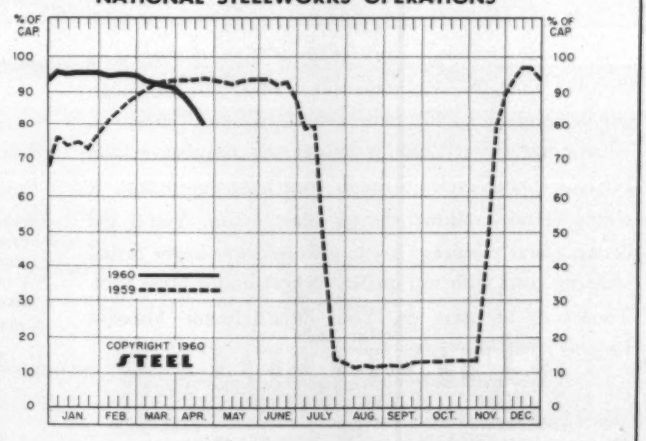
DISTRICT INGOT RATES

(Percentage of capacity utilized)

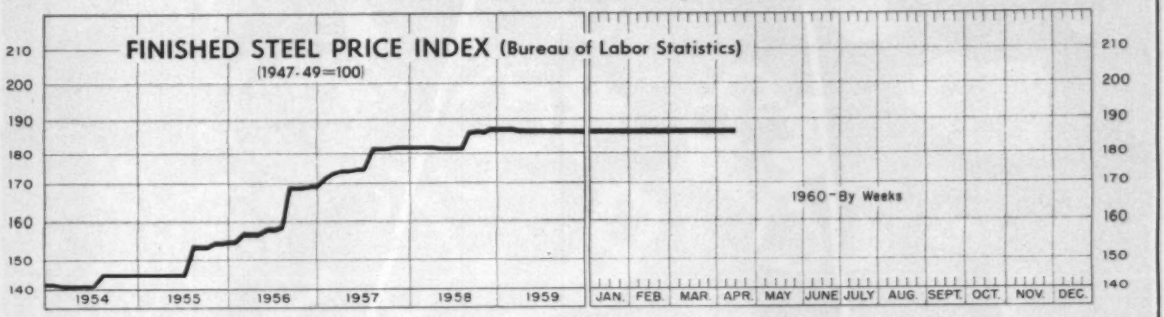
	Week Ended Apr. 17	Week Ago	Month Ago	Year Ago
Northeastern	79	86	87	97
Buffalo	87	91	103	98
Pittsburgh	82	81	94	96
Youngstown	65	74	86	89
Cleveland	92	93	100	97
Detroit	52	90	100	100
Chicago	88	92	96	94
Cincinnati	99	102	98	86
St. Louis	91	103	86	104
Southern	82	80	87	92
Western	75	71	80	93
Total Industry	79.9	84.3	91.5	93.8
Index (1947-49=100)	141.7	150.5	162.3	165.4
Net Tons (In thousands)	2,277	2,417	2,607	2,657

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Apr. 12, 1960	Week Ago	Month Ago	Feb. Index	Year Ago
186.8	186.8	186.8	186.8	186.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Apr. 12

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.385
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.765
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.905
Pipe, Galv., Buttweld (100 ft)	23.585
Pipe, Line (100 ft)	199.533
Casing, Oil Well, Carbon (100 ft)	201.060
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (bundles)	7.967
Nails, Wire, 8d Common	9.825
Wire, Barbed (80-rod spool)	8.766
Woven Wire Fence (20-rod roll)	21.880

STEEL's FINISHED PRICE INDEX*

	Apr. 13 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	194.53
Index in cents per lb	6.713	6.713	6.713	6.713	5.270

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$118.40
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	33.66	33.66	34.33	34.67	37.41

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Apr. 13 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.25
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	5.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.95	6.85
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$78.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	4.675

PIG IRON, Gross Ton

	Apr. 13 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	55.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	60.58
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

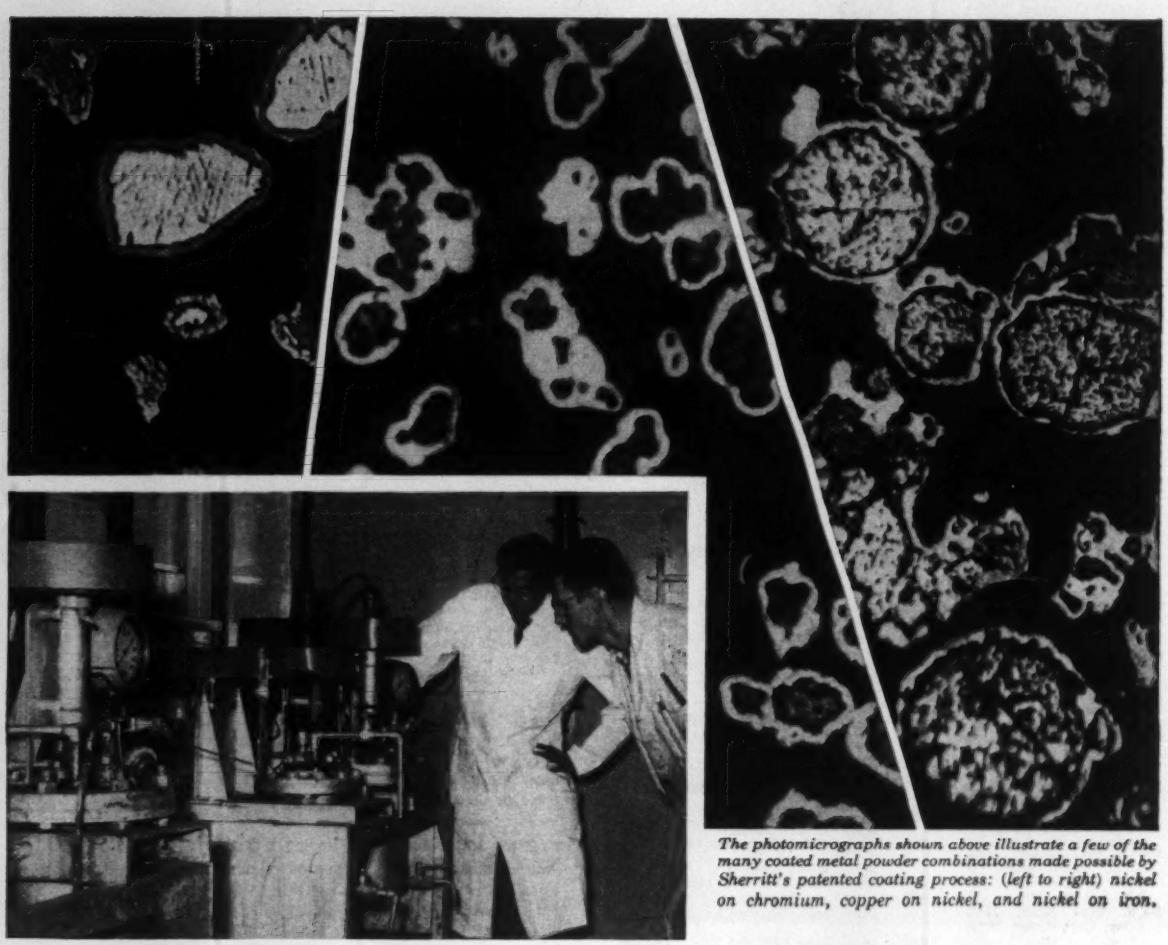
†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$34.50	$34.50	$34.50	$36.50	$38.50
No. 1 Heavy Melt, E. Pa.	35.00	35.00	36.00	33.50	37.75
No. 1 Heavy Melt, Chicago	31.50	31.50	32.50	34.00	36.00
No. 1 Heavy Melt, Valley	36.50	36.50	36.50	39.50	37.50
No. 1 Heavy Melt, Cleve.	33.50	33.50	33.50	36.00	35.00
No. 1 Heavy Melt, Buffalo	30.50	30.50	31.50	34.50	32.50
Rails, Rerolling, Chicago	53.50	53.50	53.50	57.50	52.50
No. 1 Cast, Chicago	45.50	45.50	45.50	46.50	41.50

COKE, Net Ton

Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$13.75
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	25.25



The photomicrographs shown above illustrate a few of the many coated metal powder combinations made possible by Sherritt's patented coating process: (left to right) nickel on chromium, copper on nickel, and nickel on iron.

new techniques for solid state nickel alloying

New metal coating techniques developed by the Sherritt Research Staff have greatly advanced the art of solid state alloying in powder metallurgy. These patented techniques permit controlled coating of minute metal or non-metal powders with pure nickel or cobalt.

By these new techniques metal powders sensitive to oxygen contamination while in process can now be protected by a continuous coating of nickel. The coating is intimately bonded over the entire particle surface so that compacts can be produced from a completely "nickel-plated" metal powder.

Perhaps the most significant contribution of the Sherritt developments to the art of powder metallurgy is the production of the metal/non-metal combination powders. With control of the coating completely in the hands of the metallurgist, the number of possible metal/non-metal combination powders suitable for compacting applications becomes almost unlimited.

SHERRITT

FOOTE MINERAL COMPANY is the exclusive sales agent for Sherritt nickel and cobalt in the United States and Canada. For product literature, prices, and delivery information, contact the Foote Mineral Company, 411S Eighteen West Chelten Building, Philadelphia 44, Pennsylvania.

SHERRITT GORDON MINES LIMITED

Steel Prices

Mill prices as reported to STEEL, Apr. 13, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 176; footnotes, page 178.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOTS, Alloy (NT)
Detroit 841 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa., S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 .80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken,Pa. A3 .104.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14 99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3..126.00
Detroit 841 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14 119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary,Ind. U5 ....122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 ..122.50
Warren,O. C17 ....122.50

SKELP
Aliquippa,Pa. J5 ....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 ....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
Los Angeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 ....5.50
Sterling,Ill. N15 ....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield,Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 ....8.75
Munhall,Pa. U5 ....8.05
Seattle B3 ....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 ....7.75
Struthers,O. Y1 ....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05
Sterling,Ill. N15 ....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ....5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ..5.30
Atlanta A11 ....5.50
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B3 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 ....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 ....7.05
Houston S5 ....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S. L.A.
Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. C22 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y-1..7.95
Johnstown,Pa. B2 ....7.95
Munhall,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Warren,O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 ....7.50
Claymont,Del. C22 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Conshohocken,Pa. A3..6.375
Ind.Harbor,Ind. I-2 ..6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l. (15) A10 ..5.55
Ashland l.c.l. (15) A10..6.05
Cleveland c.l. R2 ....6.05
Warren,O. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ..5.675
Aliquippa,Pa.(9) J5 ..5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ..5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 ....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ..5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ..6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 ....6.375
Owensboro,Ky.(9) G8..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ..5.675
Seattle(9) A24,B3,N15 6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15 ..5.675
Sterling,Ill.(9) N15 ..5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 ..6.375
Warren,O. C17 ....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 ....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit 841 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Fairless,Pa. U5 ....6.875
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa. (9) B2 ..5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Loaded (Including loaded extra) Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ....10.175
BeaverFalls,Pa. M12 ..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.05c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2..7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 ....7.85
Detroit 841 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5 ..7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles (49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19..6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 ....9.225
Detroit 841 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 ....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 ....9.025
Lackawanna,N.Y. B2 ..9.025
LosAngeles P2, S30 ..11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ..9.025
Midland,Pa. C18 ....9.025
Monaca,Pa. S17 ....9.025
Newark,N.J. W18 ....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. Y1 ....9.025
Warren,O. C17 ....9.025

Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ...9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.675
Birmingham C15 .....5.675
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft. Worth,Tex(4)(26)T4 5.925
Gary,Ind. U5 .....5.675
Houston S5 .....5.925
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.925
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.925
Seattle A24, B3, N14..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill.(1) N15 ....5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ...5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.60
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.60
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ....7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ...5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 ..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R., Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(38) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ...6.275
Fontana,Calif. K1 ....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2. .6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 .....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ...6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ...7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 .....7.50
Youngstown J5 .....7.50

SHEETS, Wall Casing

Fontana,Calif. K1 ....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.625
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America

T2 Tenn. Coal & Iron
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala. City, Ala. (27) R2	5.10
Allenport, Pa. P7	5.10
Alton, Ill. L1	5.30
Ashland, Ky. (8) A10	5.10
Atlanta A11	5.10
Bessemer, Ala. T2	5.10
Birmingham C15	5.10
Conshohocken, Pa. A3	5.15
Detroit M1	5.10
Ecorse, Mich. G5	5.10
Fairfield, Ala. T2	5.10
Farrell, Pa. S3	5.10
Fontana, Calif. K1	5.825
Gary, Ind. U5	5.10
Ind. Harbor, Ind. I-2, Y1	5.10
Johnstown, Pa. (25) B2	5.10
Lackaw'na, N.Y. (25) B2	5.10
LosAngeles (25) B3	5.85
LosAngeles C1	8.60
Minnequa, Colo. C10	6.20
Riverdale, Ill. A1	5.10
SanFrancisco S7	6.60
Seattle (25) B3	6.10
Seattle N14	6.60
Sharon, Pa. S3	5.10
S. Chicago, Ill. W14	5.10
S. SanFrancisco (25) B3	5.85
SparrowsPoint, Md. B2	5.10
Torrance, Calif. C11	5.85
Warren, O. R2	5.10
Weirton, W. Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18	8.40
Farrell, Pa. S3	8.40
Gary, Ind. U5	8.40
Houston S5	8.65
Ind. Harbor, Ind. Y1	8.40
KansasCity, Mo. S5	8.65
LosAngeles B3	9.60
Lowellville, O. S3	8.40
Newport, Ky. A2	8.40
Sharon, Pa. A2, S3	8.40
S. Chicago, Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10	7.575
Bessemer, Ala. T2	7.575
Conshohocken, Pa. A3	7.575
Ecorse, Mich. G5	7.575
Fairfield, Ala. T2	7.575
Farrell, Pa. S3	7.575
Gary, Ind. U5	7.575
Ind. Harbor, Ind. I-2, Y1	7.575
Lackawanna, N.Y. B2	7.575
LosAngeles (25) B3	8.325
Seattle (25) B3	8.575
Sharon, Pa. S3	7.575
S. Chicago, Ill. W14	7.575
S. SanFrancisco (25) B3	8.325
SparrowsPoint, Md. B2	7.575
Warren, O. R2	7.575
Weirton, W. Va. W6	7.575
Youngstown U5, Y1	7.875

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10	5.35
Warren, O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn, Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover, O. G6	7.425
Evanston, Ill. M22	7.525
Farrell, Pa. S3	7.425
Follansbee, W. Va. W10	7.425
Fontana, Calif. K1	9.20
FranklinPark, Ill. T6	7.525
Ind. Harbor, Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport, Pa. E10	7.525
NewBedford, Mass. R10	7.875
NewBritain, Conn. S15	7.875
NewCastle, Pa. B4, E5	7.425
NewHaven, Conn. D2	7.875
NewKensington, Pa. A6	7.425
Pawtucket, R.I. R3	7.975
Pawtucket, R.I. N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale, Ill. A1	7.525
Rome, N.Y. (32) R6	7.425
Sharon, Pa. S3	7.425
Trenton, N.J. (31) R5	8.875
Wallingford, Conn. W2	7.875
Warren, O. R2, T5	7.425
Worcester, Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie, Pa. S18	15.55
Cleveland A7	15.55
Dover, O. G6	15.55
Farrell, Pa. S3	15.55
FranklinPark, Ill. T6	15.55
Harrison, N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville, O. S3	15.55
Pawtucket, R.I. N8	15.90
Riverdale, Ill. A1	15.55
Sharon, Pa. S3	15.55
Worcester, Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn, Mich. S3	10.80
Dover, O. G6	10.80
Farrell, Pa. S3	10.80
Ind. Harbor, Ind. Y1	10.80
Sharon, Pa. S3	10.80
Warren, O. R2	10.80

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	8.95	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain, Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle, Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	9.85	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Wallingford, Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	0.80C	1.05C	1.35C
Bristol, Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria, O. S1	19.05	22.15	....
FranklinPark, Ill. T6	19.20	23.30	28.15
Harrison, N.J. C18	18.85	22.95	27.80
NewYork W3	18.55	22.95	27.80
Palmer, Mass. W12	18.85	....	....
Trenton, N.J. R5	18.55	22.95	27.80
Worcester, Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$9.10	$9.35	$9.75
Fairfield, Ala. T2	9.20	9.45	9.85
Fairless, Pa. U5	9.20	9.45	9.85
Fontana, Calif. K1	9.75	10.00	10.40
Gary, Ind. U5	9.10	9.35	9.75
GraniteCity, Ill. G4	9.20	9.45	9.60
IndianaHarbor, Ind. I-2, Y1	9.10	9.35	9.75
Irvin, Pa. U5	9.10	9.35	9.75
Niles, O. R2	9.10	9.35	9.75
Pittsburg, Calif. C11	9.75	10.00	10.40
SparrowsPoint, Md. B2	9.10	9.35	9.75
Weirton, W. Va. W6	9.10	9.35	9.75
Yorkville, O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa, Pa. J5 (21-27 Ga.)	....	7.90	8.10	....
IndianaHarbor, Ind. Y1 (20-27 Ga.)	....	7.90	....	....
Niles, O. R2 (20-27 Ga.)	....	7.90	8.10	8.30

TIN PLATE, Hot Dipped 1.25 Common Coke lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65
Fairfield, Ala. T2	10.50	10.75
Fontana, Calif. K1	11.05	11.30
Gary, Ind. U5	10.40	10.65
Ind. Harb. Y1	10.40	10.65
Irvin, Pa. U5	10.40	10.65
Pitts., Calif. C11	11.05	11.30
Sp. Pt., Md. B2	10.40	10.65
Weirton, W. Va. W6	10.40	10.65
Yorkville, O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa, Pa. J5	$8.20
Fairfield, Ala. T2	8.30
Fairless, Pa. U5	8.30
Fontana, Calif. K1	8.85
Gary, Ind. U5	8.20
GraniteCity, Ill. G4	8.30
Ind. Harbor, Ind. I-2, Y1	8.20
Irvin, Pa. U5	8.20
Niles, O. R2	8.20
Pittsburg, Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton, W. Va. W6	8.20
Yorkville, O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa, Pa. J5	7.85
Gary, Ind. U5	7.85
GraniteCity, Ill. G4	7.95
Ind. Harbor, Ind. Y1	7.85
Irvin, Pa. U5	7.85
Yorkville, O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary, Ind. U5	$10.05
Irvin, Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W. Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
GraniteCity, Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor, Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield, O. E6	9.875	11.70	12.40	13.55	14.65
Newport, Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles, O. M21	9.875	11.70	12.40	13.55	....
Vandergrift, Pa. U5	9.875	11.70	12.40	13.55	14.65
Warren, O. R2	9.875	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift, Pa. U5	8.10
Mansfield, O. E6	8.10
Warren, O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom, W. Va. W10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler, Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift, Pa. U5	..	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2	8.00
Aliquippa, Pa. J5	8.00
Alton, Ill. L1	8.20
Atlanta A1	8.00
Bartonville, Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville, Ind. M8	8.10
Donora, Pa. A7	8.00
Duluth A7	8.00
Fairfield, Ala. T2	8.00
Fostoria, O. (24) S1	8.10
Houston S5	8.25
Jacksonville, Fla. M8	8.35
Johnstown, Pa. B2	8.00
Joliet, Ill. A7	8.00
KansasCity, Mo. S5	8.25
Kokomo, Ind. C16	8.10
LosAngeles B3	8.95
Milbury, Mass. (12) N6	10.05
Minnequa, Colo. C10	8.25
Monessen, Pa. P7, P16	8.00
Palmer, Mass. W12	8.30
Pittsburg, Calif. C11	8.95
Portsmouth, O. P12	8.00
Rankin, Pa. A7	8.00
S. Chicago, Ill. R2	8.00
S. SanFrancisco C10	8.95
SparrowsPoint, Md. B2	8.10
Sterling, Ill. (1) N15	8.00
Sterling, Ill. N15	8.10
Struthers, O. Y1	8.00
Waukegan, Ill. A7	8.00
Worcester, Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria, O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville, Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora, Pa. A7	12.65
Duluth A7	12.65
Johnstown, Pa. B2	13.40
KansasCity, Mo. U3	12.90
Minnequa, Colo. C10	12.775
Monessen, Pa. P7, P16	12.65
Muncie, Ind. I-7	13.60
NewHaven, Conn. A7	12.95
Palmer, Mass. W12	13.70
Pittsburg, Calif. C11	13.45
Portsmouth, O. P12	12.65
Roebling, N.J. R5	12.95
SparrowsPt., Md. B2	13.50
Struthers, O. Y1	13.40
Trenton, N.J. A7	12.95
Waukegan, Ill. A7	12.65
Worcester, Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5	9.75
Alton, Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora, Pa. A7	9.75
Duluth A7	9.75
Johnstown, Pa. B2	9.75
KansasCity, Mo. S5, U3	10.00
Kokomo, Ind. C16	9.85
LosAngeles B3	10.70
Minnequa, Colo. C10	9.95
Monessen, Pa. P7, P16	9.75
NewHaven, Conn. A7	10.05
Palmer, Mass. W12	10.05
Pittsburg, Calif. C11	10.70
Portsmouth, O. P12	9.75
Roebling, N.J. R5	10.05
S. Chicago, Ill. R2	9.75
S. SanFrancisco C10	10.70
SparrowsPt., Md. B2	9.85
Struthers, O. Y1	9.75
Trenton, N.J. A7	10.05
Waukegan, Ill. A7	9.75
Worcester, Mass. A7, J4, T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1	16.50
Bartonville, Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville, Ind. M8	16.40
Fostoria, O. S1	16.30
Houston S5	16.55
Jacksonville, Fla. M8	16.65
Johnstown, Pa. B2	16.30
KansasCity, Mo. S5	16.55
Kokomo, Ind. C16	16.30
Minnequa, Colo. C16	16.55
Monessen, Pa. P16	16.30
Muncie, Ind. I-7	16.50
Palmer, Mass. W12	16.60
S. SanFrancisco C10	17.15
Waukegan, Ill. A7	16.30
Worcester, Mass. A7, J6	16.60

WIRE, Tire Bead

Bartonville, Ill. K4	17.15
Monessen, Pa. P16	17.15
Roebling, N.J. R5	17.65

ROPE WIRE (A)

Bartonville, Ill. K4	13.45
Buffalo W12	13.45
Fostoria, O. S1	13.45
KansasCity, Mo. U3	13.70
Johnstown, Pa. B2	13.45
Monessen, Pa. P7	13.45
Muncie, Ind. I-7	13.65
Palmer, Mass. W12	13.75
Portsmouth, O. P12	13.45
Roebling, N.J. R5	13.75
St. Louis L8	13.45
SparrowsPt., Md. B2	13.55
Struthers, O. Y1	13.45
Worcester, Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.49
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.79
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.84
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213•
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)

	An'ld Galv.	Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality (6 to 8 gage)

	An'ld Galv.	
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48)A11	9.10	9.775‡
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65†
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts, per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nuts 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

CAP AND SETSCREWS, Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16
Flat Head Cap Screws: ¾ in. and smaller, 6 in. and shorter:	
Packages	+85
Bulk	+38
Setscrews, Square Head, Cup Point, Coarse Thread: Through 1 in. diam, 6 in. and shorter:	
Packages	+ 5
Bulk	+19
Through 1 in. diam., longer than 6 in.:	
Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

⅞ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Alton,Ill. L1	$28.95	$43.40	$55.40	$73.00	$95.10
Buffalo W12	28.95	43.40	55.40	73.00	95.10
Cleveland A7	28.95	43.40	55.40	73.00	....
KansasCity,Mo. U3	29.85	43.00	55.40	73.00	95.10
Monessen,Pa. P16	32.15	48.20	61.55	81.10	105.65
NewHaven,Conn. A7	28.95	43.40	55.40	73.00	95.10
Pittsburg,Calif. C11	28.95	43.40	55.40	73.00	95.10
Minnequa,Colo. C10	28.95	43.40	55.40	73.00	95.10
Roebling,N.J. R5	28.95	43.40	55.40	73.00	95.10
SparrowsPoint,Md. B2	28.95	43.40	55.40	73.00	95.10
St.Louis L8	28.95	43.40	55.40	73.00	95.10
Waukegan,Ill. A7	28.95	43.40	55.40	73.00	95.10

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D.	B.W.	Seamless		Elec. Weld
In.	Gage	H.R.	C.D.	H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

	Standard			Tee Rails
Rails	No. 1	No. 2	All No. 2	60 lb Under
Bessemer,Pa. U5	5.75	5.60	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2	15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 2½ in. and smaller rounds, 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛ *		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.72		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI	—Rerolling—		Forging		H.R. Rods; C.F.	Bars; Structural			C.R. Strip; Flat
Type	Ingot	Slabs	Billets	H.R. Strip	Wire	Shapes	Plates	Sheets	Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp., American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co., Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	10%	15%	20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	48.90	59.55	70.15	80.55	....
Nickel	41.65	51.95	63.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	$36.80	$44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13)	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	....	62.50‡	66.50	....
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075%)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Baltimore	8.53	8.66	10.06	....	10.94	9.33	11.80	16.38	9.92	9.15	10.50
Birmingham	9.43	10.20	10.46	....	10.41	9.09	13.14	16.76	9.00	9.29	10.90
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.80	9.95	11.15	55.98	10.65	9.00	11.45	16.30	9.65	9.00	10.85
Charlotte, N. C.	10.81	11.22	11.34	....	12.29	10.97	12.68	....	11.38	11.17	12.18
Chicago	8.74	10.20	10.95	53.00	10.40	8.84	10.65	15.95	9.33	8.67	10.46
Cincinnati	8.91	10.26	11.00	53.43	10.72	9.16	11.53	16.27	9.89	9.05	10.79
Cleveland	8.73	9.88	11.14	52.33	10.51	8.96	11.25	16.06	9.75	8.92	10.56
Dallas	9.47	10.30	12.59	....	11.03	8.88	12.98	16.95	9.11	9.20	10.87
Detroit	9.00	10.46	11.30	56.50	10.77	9.15	11.01	16.23	9.89	9.04	10.72
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.12	9.93	12.19	52.00	10.68	8.53	13.10	16.55	8.76	8.85	10.52
Indianapolis	9.18	10.64	11.39	....	10.84	9.28	11.09	16.39	9.77	9.11	10.90
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.95	'11.55	12.20	57.60	11.55	9.75	14.20	17.35	10.00	10.00	11.85
Milwaukee	8.88	10.34	11.09	....	10.54	8.98	10.89	16.09	9.55	8.81	10.60
New York	9.36	10.13	11.35	53.08	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	9.10	10.00	10.89	52.17	11.10	9.50	11.95	16.38	9.85	9.55	10.55
Pittsburgh	8.73	9.88	11.03	52.33	10.49	8.85	11.25	15.95	9.36	8.68	10.32
St. Louis	8.54	10.58	11.33	....	10.50	8.95	11.28	16.33	9.45	8.78	10.57
St. Paul	9.00	9.59	10.74	....	10.66	9.12	11.49	16.54	9.63	8.95	10.49
San Francisco	10.90	11.85	11.55	55.10	12.15	10.65	15.10	17.25	10.85	10.90	12.90
Seattle	11.55	12.30	12.50	56.52	12.65	11.10	16.20	17.80	11.20	11.00	13.10
Spokane, Wash.	11.55	12.30	12.50	57.38	13.15	11.60	16.20	17.80	11.20	11.00	13.60

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. x 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, ¾ in.—2½ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, ¼ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Ressdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, tins Ferry, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Ores

Lake Superior Iron Ore

(Prices effective at start of the 1959 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1959, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	21.00†
Brazilian iron ore, 68.5%	21.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.00-19.50
Domestic, concentrates, f.o.b. milling points	22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian, 88-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian	
48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†
South African Transvaal	
44% no ratio	18.00†
48% no ratio	24.00-26.00†
Turkish	
48% 3:1	36.00-37.00†
Domestic	
Rail nearest seller	
18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo contents, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.75
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens:	
New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	5.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per net ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon, Forging Quality (net ton)	$97.00
Alloy (net ton)	115.00
Wire Rods:	
Carbon, $\frac{5}{32}$" to under ¼ in.	5.30
Carbon, ¼ in. to 47/64 in.	5.70
Alloy	6.40
Wire (carload lots)	8.40
Bars & Small Shapes:	
Carbon, merchant quality	5.40
Carbon, special quality	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Structural Size Angles & Zees	5.40
Plates:	
Carbon	5.45
Sheets & Coils, Hot Rolled:	
Carbon Sheets	5.00
Carbon Strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon Sheets	6.35
Carbon Strip (0.080 and lighter)	6.35
Carbon Strip (0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard Quality	6.70
Culvert Quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field Grade	9.00
Armature Grade	9.50
Electrical Grade	10.15
Tin Mill Products (Per Base Box; 100 lb base wt)	
Coke Tin Plate (1.25 lb pot yield)	$10.60
Electrolytic Tin Plate (0.25 lb coating)	9.10
Black Plate	8.30
Nails, c.l. lots, 400 keg min. (per keg)	$8.15

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. truckiots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails, 00 9.85‡	
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.87% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe. .36.75, ton, del. east of Mississippi.	
Unannealed (99+% Fe) 33.0 f.o.b.	
Unannealed (99+% Fe) (minus 325 mesh)	58.0
f.o.b.	
Carbonyl Iron:	
98.1-98.9%, 2 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500-lb drum freight allowed, c.l. 38.50; ton lots 40.50	
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	35.10-52.20†
Bronze, 500-lb lots	53.10-56.70†
Copper, electrolytic	14.25*
Copper, reduced	14.25*
Lead	7.50*
Manganese, Electrolytic: Minus 35 mesh	$1.00
Nickel	$1.15
Nickel-Silver, 5000-lb lots	60.70-69.00†
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots	46.50-64.50
Solder	7.00*
Silicon	70.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Tin	14.00*
Zinc, 5000-lb lots	21.20-34.40‡
Tungsten: Carbon reduced, 98.8% min., minus 65 mesh	Dollars nom.**
Chromium electrolytic 99.8% Cr, min., metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §Cutting and scarfing grade. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	*$5.90*	*$5.95*	*$5.80*	*$5.65*	*$6.05*
Bar Size Angles	5.95	6.00	5.85	5.75	6.10
Structural Angles	5.86	5.91	5.76	5.66	6.01
I-Beams	5.86	5.91	5.76	5.66	6.01
Channels	5.86	5.91	5.76	5.66	6.01
Plates (basic bessemer)	5.98	6.03	5.88	5.78	6.13
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	9.70	9.75	9.60	9.50	9.85
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	9.60	9.65	9.50	9.40	9.75
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.08	24.20	24.42	24.15	25.47
Barbed Wire (†)	6.50	6.55	6.40	6.30	6.65
Merchant Bars	6.39	6.44	6.29	6.19	6.54
Hot-Rolled Bands	7.90	7.95	7.80	7.70	8.05
Wire Rods, Thomas Commercial No. 5	6.60	....	6.45	6.45	6.70
Wire Rods, O. H.	7.05	....	6.90	6.90	7.15
Bright Common Wire Nails (‡)	7.80	7.85	7.50	7.60	7.95

†Per 82 lb net reel. ‡Per 100-lb keg. 20d nails and heavier.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton. Palmerton, Pa. 21-23% Mn, $102.50, 19-21% Mn, 1-3% Si, $100; 18-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net tons, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35 less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c.

Blocking Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c; No. 2 (Cr 58-63%, C 5-6%, Si 8-10%), 23.00c; No. 3 (Cr 58-63%, C 5-6%, Si 10-12%), 23.00c.

Refined Charge Chrome: No. 1 (Cr 50-55%, C 5% max, Si 2% max), 25.00c; No. 2 (Cr 56-60% C 5% max, Si 2% max), 25.00c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 31.50c per lb contained Cr; 0.010% max, 32.50c. Delivered.
Cr 67-71%, carload, lump, bulk, 0.025% max, 34.50c; 0.05% max, 33.50c; 0.10% max, 33.25c; 0.20% max, 33.00c; 0.50% max, 32.75c; 1.0% max, 32.50c; 1.5% max, 32.25c; 2.0% max, 32.00c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 3M x D, carload, bulk, 20.05c per lb of alloy carload packed, 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 26.25c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 28.25c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down 29.40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot, packed, 2" x D plate (about ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al 40%, Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l., packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ⅛ lb of Si). C.l. bulk 14c per lb of briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 19.25c. Packed c.l. 20.25c, 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans, $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

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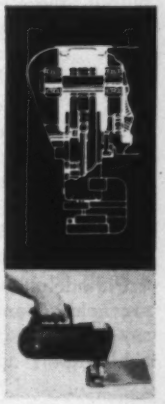

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Scrap Holding in Slow Market

STEEL's composite on No. 1 heavy melting unchanged for the second straight week, but market lacks thorough test. Buying limited, with steelmaking operations sagging

Scrap Prices, Page 186

• **Pittsburgh** — Brokers' bids on Pennsylvania Railroad's No. 1 heavy melting scrap were surprisingly high. Most of the material was sold at $39.75, almost $3 a ton more than other carriers had received. Observers say the transaction isn't repsentative of the market. In their opinion, the buyer paid a premium for segregated 2 ft material. A major consumer bought No. 1 dealer heavy melting scrap last week, paying $35 a ton, delivered, to nearby shippers and $36 to those whose freight rates will be over $3.

• **Chicago**—The market is coasting with consumer buying negligible and prices unchanged. Activity is too light to provide a good price test, but market factors are on the side of weakness. For the first time this year, district steelmaking operations have fallen below 90 per cent of capacity. The schedule calls for 88 per cent, and some of the output represents buildng up of semifinished steel inventories at mills. For the first time since the end of the steel strike, the mills are able to increase and round out semifinished inventories. Foundries have short backlogs of castings orders, and new buying has slackened markedly. Buying of cast iron scrap is hand to mouth.

• **Philadelphia**—Steelmaking grades are holding unchanged, but dealers say that were it not for a fairly brisk export demand, prices would be lower. In the cast iron grades, heavy breakable is quoted up $1 a ton to $43, delivered.

• **New York**—Slack domestic demand for steel scrap is being offset in a measure by fairly good buying on export account, and prospects for foreign shipments are promising into May. Meanwhile, brokers' buying prices on all grades are unchanged, except for 18-8 sheets, clips, and solids, which are off another $5 a ton to $85-$90.

• **Cleveland** — A little buying by Valley mills last week confirmed quoted prices in that area and here. Also, the purchase of some foundry grades substantiated quoted prices on those items, including cut foundry steel which went at $36 a ton. Generally, the outlook is not encouraging. Some traders think the market will drop at least another $2 before the bottom is reached.

• **Cincinnati**—The market is sluggish, with mill orders being slowly filled. Prices on the steelmaking

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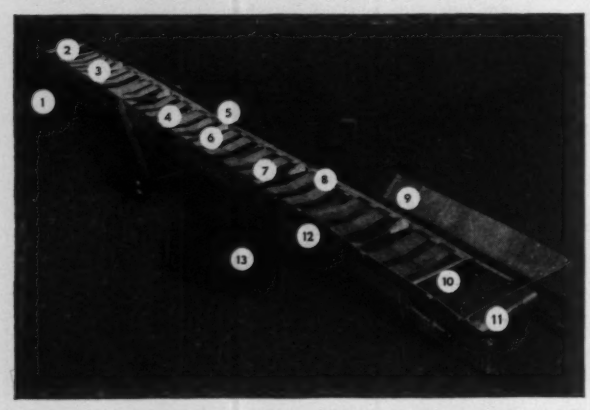

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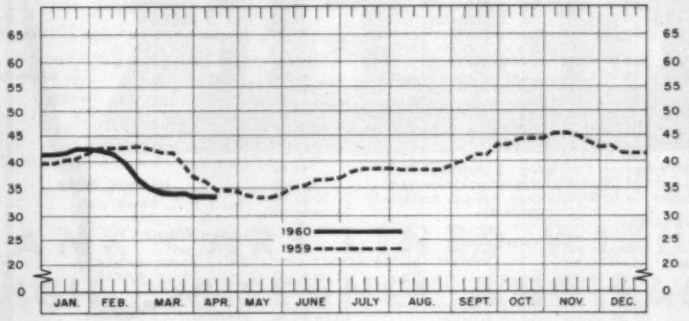
STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL.



Apr. 13 1960	Week Ago	Month Ago	Year Ago	Mar. Avg.
$33.66	$33.66	$34.33	$34.67	$33.99

grades are unchanged. District steelmaking operations are continuing at a high rate, providing bullish sentiment in the market.

• **Detroit**—Brokers and dealers report minor activity in bundles, busheling, and heavy breakable cast, but there's not enough tonnage involved to make for price changes. Dealers feel that if auto list tonnages are smaller, monthend prices should move up slightly, but the chances are that present levels will hold through April.

• **Buffalo** — Dealers are concerned about the sharp drop in steel mill operations. The slump has been more severe than they had anticipated. The mills' scrap requirements are tapering with ingot operations. The outlook for a rise in prices is not promising, especially with a large tonnage of boat scrap expected to arrive here immediately after the opening of lake navigation.

• **Houston**—No price change is expected in this market before May. Texas mills have covered their needs through April, and there is not much change in demand from the Mexican mills in prospect. Over-the-scale tonnage is declining with the advent of full scale farming operations. A little easing in prices on the scrap grades is noted, with foundry buying limited.

• **Birmingham**—Scrap continues to move slowly in this area, but prices are holding at the levels recently established. The Atlanta mill purchased No. 2 bundles at unchanged prices. Open hearth and electric furnace scrap users are out of the market, but some pipe mills are buying cast at unchanged prices.

• **San Francisco**—Little steel scrap is moving to consumers despite the cut of $1 a ton that was effected recently. Exports to Japan are about the only tonnage providing support to the market.

• **Seattle**—Larger consumers are carrying heavy inventories, and there is little activity in the market as a result. Ample supplies are available, but dealers are sitting tight, awaiting developments. Prices are unchanged from last week's revised levels. There is no export activity in this area, although a full cargo is being assembled at Portland, Oreg., for shipment to Japan in late April.

Plates . . .

Plate Prices, Page 175

Despite the advancing spring season, plate demand has shown little improvement. Structural fabricators are taking a little more tonnage, but there has been no noticeable change in tank and boiler requirements, or in industrial equipment needs generally. Railroad buying is spotty, while shipwork is slow, reflecting the prolonged strike at eight Eastern yards of Bethlehem Steel Co.

Structural Shapes . . .

Structural Shape Prices, Page 175

Structural market activity continues to improve, though jobs are still relatively small and comprised principally of public work. A growing number of inquiries should boost buying over the next several weeks.

Bridge estimating has increased in all New England states. Close to 10,000 tons are up for bids. More wide flange and plate girder volume is included.

Prices for fabricated and erected structurals show little or no increase from those prevailing in first quarter. With backlogs lower and shipments in most cases heavier than bookings, competition for new tonnage has intensified. Most shops are back to schedule on shipments, and are placing orders for plain material to meet current contracts only. They have built up inventory to meet contingencies.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1025 tons, three 3 span and two 1 span composite wide flange bridges, Interstate Route 89, Waterbury, Vt., contract No. 1, Waterbury-Bolton project; bids Apr. 22, Montpelier, Vt.; also, 250 tons of reinforcing bars, and 200 tons of steel piles are required.

705 tons, one 6 span, one 5 span, and one single span, composite wide flange bridges, Bolton, Vt., Interstate Route 89, Bolton, Vt., Contract No. 3, Waterbury-Bolton project; bids Apr. 29, Montpelier, Vt.; and, 210 tons of reinforcing bars and 105 tons of steel piles are required.

650 tons, bridge in Bucks County, Pennsylvania, LR 1000 (F-2C), for the state highway and bridge authority, to American Bridge Div., U. S. Steel Corp., Pittsburgh.

555 tons, wide flange, Navy, General Stores Supply Office, Philadelphia, to Meldon Steel Co. Inc., Westbury, N. Y.

510 tons, angles, two contracts, Navy, General Stores Supply Office, Philadelphia, bids Apr. 19.

485 tons, angles, Navy, General Stores Supply Office, Philadelphia; bids Apr. 20.

365 tons, state bridgework, Lackawanna County, Pennsylvania, LR 790 (IC), for the Pennsylvania Department of Highways, to the Anthracite Bridge Co., Scranton, Pa.

350 tons, state bridgework, LR 799 (4), Cumberland County, Pennsylvania, for the Department of Highways to the Cumberland Steel Co., Cumberland, Pa.

180 tons, Mt. St. Joseph School, Philadelphia, to Easton Steel Structures Inc., Easton, Pa.

158 tons, two state highway bridges, North Haven, Conn.; Brunalli Construction Co. Inc., Southington, Conn., low on the general contract; also, 365 tons of steel piles, 100 tons of reinforcing bars, and 55 tons of sheet piling.

125 tons, communications facilities, Ketchikan, Alaska, to Leckenby Structural Steel Co., Seattle; Manson Construction & Engineering Co., Seattle, general contractor.

85 tons, jail equipment, hospital addition to Washington State Penitentiary, Walla Walla, Wash., to Herrick Iron Works, Hayward, Calif., at $41,840.

STRUCTURAL STEEL PENDING

1500 tons or more, Oregon state highway work, Curry County; bids to Salem, Oreg., Apr. 19.

(*Please turn to Page* 191)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Apr. 13, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Apr. 13	$33.66
Apr. 6	33.66
Mar. Avg.	33.99
Apr. 1959	34.96
Apr. 1955	36.73

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	29.00-30.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	26.00-27.00
No. 1 busheling	34.00-35.00
No. 1 factory bundles	41.00-42.00
Machine shop turnings	17.00-18.00
Mixed borings, turnings	17.00-18.00
Short turnings	24.00-25.00
Cast iron borings	24.00-25.00
Cut structurals:	
2 ft and under	*42.00-43.00*
3 ft and under	*41.00-42.00*
Heavy turnings	31.00-32.00
Punchings & plate scrap	45.00-46.00
Electric furnace bundles	43.00-44.00
Cast Iron Grades	
No. 1 cupola	*42.00-43.00*
Stove plate	46.00-47.00
Unstripped motor blocks	32.00-33.00
Clean auto cast	47.00-48.00
Drop broken machinery	51.00-52.00
Railroad Scrap	
No. 1 R.R. heavy melt.	37.00-38.00
Rails, 2 ft and under	59.00-60.00
Rails, 18 in. and under	60.00-61.00
Random rails	*52.00-53.00*
Angles, splice bars	46.00-47.00
Railroad specialties	*47.00-48.00*
Rails, rerolling	64.00-65.00
Stainless Steel Scrap	
18-8 bundles & solids	220.00-225.00
18-8 turnings	120.00-125.00
430 bundles & solids	120.00-125.00
430 turnings	55.00-65.00

CHICAGO

No. 1 hvy melt., indus.	32.00-33.00
No. 1 hvy melt., dealer	30.00-31.00
No. 2 hvy melting	28.00-29.00
No. 1 factory bundles	36.00-37.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	20.00-21.00
No. 1 busheling, indus.	32.00-33.00
No. 1 busheling, dealer	30.00-31.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	38.00-39.00
Punchings & plate scrap	40.00-41.00
Cast Iron Grades	
No. 1 cupola	45.00-46.00
Stove plate	40.00-41.00
Unstripped motor blocks	39.00-40.00
Clean auto cast	53.00-54.00
Drop broken machinery	53.00-54.00
Railroad Scrap	
No. 1 R.R. heavy melt.	33.00-34.00
R.R. malleable	52.00-53.00
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	53.00-54.00
Angles, splice bars	45.00-46.00
Axles	51.00-52.00
Rails, rerolling	53.00-54.00
Stainless Steel Scrap	
18-8 bundles, solids	210.00-215.00
18-8 turnings	110.00-115.00
430 bundles & solids	115.00-120.00
430 turnings	55.00-60.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	17.00-18.00
No. 1 bundles	31.00-32.00
No. 2 bundles	15.00-16.00
No. 1 busheling	28.00-29.00
Machine shop turnings	12.00-13.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	10.00-11.00
Cast Iron Grades	
No. 1 cupola	40.00-41.00
Stove plate	34.00-35.00
Heavy breakable	34.00-35.00
Unstripped motor blocks	26.00-27.00
Charging box cast	34.00-35.00
Clean auto cast	47.00-48.00

CLEVELAND

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	24.00-25.00
No. 1 factory bundles	37.00-38.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	33.00-34.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	35.00-36.00
Cut structurals, plate 2 ft and under	43.00-44.00
Low phos. punchings & plate	34.00-35.00
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	34.00-35.00
Cast Iron Grades	
No. 1 cupola	49.00-50.00†
Charging box cast	33.00-34.00†
Heavy breakable cast	35.00-36.00†
Stove plate	44.00-45.00†
Unstripped motor blocks	37.00-38.00
Brake shoes	35.00-36.00†
Clean auto cast	52.00-53.00†
Burnt cast	42.00-43.00†
Drop broken machinery	54.00-55.00
Railroad Scrap	
R.R. malleable	49.00-50.00
Rails, 2 ft and under	56.00-57.00
Rails, 18 in. and under	57.00-58.00
Rails, random lengths	49.00-50.00
Cast steel	42.00-43.00
No. 1 railroad cast	52.00-53.00
Railroad specialties	45.00-46.00
Angles, splice bars	45.00-46.00
Rails, rerolling	60.00-61.00
Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)	
18-8 bundles, solids	205.00-210.00†
18-8 turnings	105.00-110.00†
430 clips, bundles, solids	110.00-115.00†
430 turnings	35.00-45.00†

YOUNGSTOWN

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	27.00-28.00†
No. 1 busheling	36.00-37.00
No. 1 bundles	36.00-37.00
No. 2 bundles	23.00-24.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	37.00-38.00
Electric furnace bundles	37.00-38.00
Railroad Scrap	
No. 1 R.R. heavy melt.	37.00-38.00

BUFFALO

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	30.00-31.00
No. 2 bundles	23.00-24.00
No. 1 busheling	30.00-31.00
Shovel turnings	21.00-22.00
Machine shop turnings	17.00-18.00
Cast iron borings	19.00-20.00
Low phos. structurals and plate, 2 ft and under	41.00-42.00
Cast Iron Grades (F.o.b. shipping point)	
No. 1 cupola	45.00-46.00
No. 1 machinery	49.00-50.00
Railroad Scrap	
Rails, random lengths	44.00-45.00
Rails, 3 ft and under	50.00-51.00
Railroad specialties	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	31.50-32.50
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.50-32.50
No. 2 bundles	21.00-22.00
No. 1 busheling	31.50-32.50
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Shovel turnings	18.00-19.00
Cast iron borings	18.00-19.00
Low phos. 18 in.	*42.00-43.00*
Cast Iron Grades	
No. 1 cupola	*40.00-41.00*
Heavy breakable cast	36.00-37.00
Charging box cast	38.00-39.00
Drop broken machinery	51.00-52.00
Railroad Scrap	
No. 1 R.R. heavy melt.	37.00-38.00
Rails, 18 in. and under	*54.00-55.00*
Rails, random lengths	48.00-49.00

PHILADELPHIA

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00
No. 1 bundles	37.00
No. 2 bundles	22.00
No. 1 busheling	37.00
Electric furnace bundles	38.00
Mixed borings, turnings	19.00†
Shovel turnings	23.00†
Machine shop turnings	19.00†
Heavy turnings	29.00†
Structurals & plates	38.00-41.00
Couplers, springs, wheels	44.00
Rail crops, 2 ft & under	58.00-60.00
Cast Iron Grades	
No. 1 cupola	41.00
Heavy breakable cast	*43.00*
Drop broken machinery	51.00-52.00
Malleable	55.00-56.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	8.00-9.00†
Mixed borings, turnings	9.00-10.00
Shovel turnings	12.00-13.00†
Low phos. structurals & plates	38.00-39.00
Cast Iron Grades	
No. 1 cupola	37.00-38.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	34.00-35.00
Stainless Steel	
18-8 sheets, clips, solids	*185.00-190.00*
18-8 borings, turnings	90.00-95.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	75.00-80.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	26.00-27.00
No. 1 busheling	26.00-27.00
Machine shop turnings	6.00-7.00
Shovel turnings	11.00-12.00
No. 1 cast	39.00-40.00
Mixed cupola cast	33.00-34.00
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	21.00-22.00
No. 1 busheling	35.00-36.00
Cast iron borings	12.00-13.00
Machine shop turnings	21.00-22.00
Shovel turnings	22.00-23.00
Bar crops and plate	41.00-42.00
Structurals & plate	40.00-41.00
Electric furnace bundles	35.00-36.00
Electric furnace:	
3 ft and under	33.00-34.00
2 ft and under	34.00-35.00
Cast Iron Grades	
No. 1 cupola	48.00-49.00
Stove plate	48.00-49.00
Charging box cast	29.00-30.00
Unstripped motor blocks	38.00-39.00
No. 1 wheels	38.00-39.00
Railroad Scrap	
No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	50.00-51.00
Rails, random lengths	45.00-46.00
Angles, splice bars	42.00-43.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	33.00
No. 2 heavy melting	31.00
No. 1 bundles	35.00
No. 2 bundles	*21.50*
No. 1 busheling	35.00
Machine shop turnings	15.50
Shovel turnings	18.00
Cast Iron Grades	
No. 1 cupola	48.00
Charging box cast	41.00†
Heavy breakable cast	40.00†
Unstripped motor blocks	39.00†
Clean auto cast	50.00
Stove plate	*41.00*
Railroad Scrap	
No. 1 R.R. heavy melt.	35.00
Rails, 18 in. and under	46.00†
Rails, random lengths	45.00
Rails, rerolling	56.00†
Angles, splice bars	44.00†

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	34.00
No. 2 heavy melting	31.00
No. 2 bundles	19.00
Machine shop turnings	13.00-13.50
Low phos. plate & structurals	38.00-39.00
Cast Iron Grades	
No. 1 cupola	*35.00*
Heavy breakable	*27.00†*
Foundry malleable	*31.00†*
Unstripped motor blocks	*31.00-32.00*
Railroad Scrap	
No. 1 R.R. heavy melt.	34.00†

LOS ANGELES

No. 1 heavy melting	*33.00*
No. 2 heavy melting	*29.00*
No. 1 bundles	*30.00*
No. 2 bundles	*17.00*
Machine shop turnings	16.00
Shovel turnings	16.00
Cast iron borings	16.00
Cut structurals and plate 1 ft and under	*43.00*
Cast Iron Grades	
No. 1 cupola	44.00
Railroad Scrap	
No. 1 R.R. heavy melt.	39.00

PORTLAND, OREG.

No. 1 heavy melting	33.00
No. 2 heavy melting	29.00
No. 1 bundles	29.00
No. 2 bundles	24.00
Shovel turnings	16.00
Electric furnace bundles	43.00
Cast Iron Grades	
No. 1 cupola	31.00
Heavy breakable	26.00
Unstripped motor blocks	24.00
Stove plate	21.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	32.00
No. 2 heavy melting	28.00
No. 1 bundles	28.00
No. 2 bundles	23.00
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Electric furnace No. 1	42.00
Cast Iron Grades	
No. 1 cupola	30.00
Heavy breakable cast	25.00
Unstripped motor blocks	23.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	34.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00
Cast Iron Grades	
No. 1 cupola	44.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices)

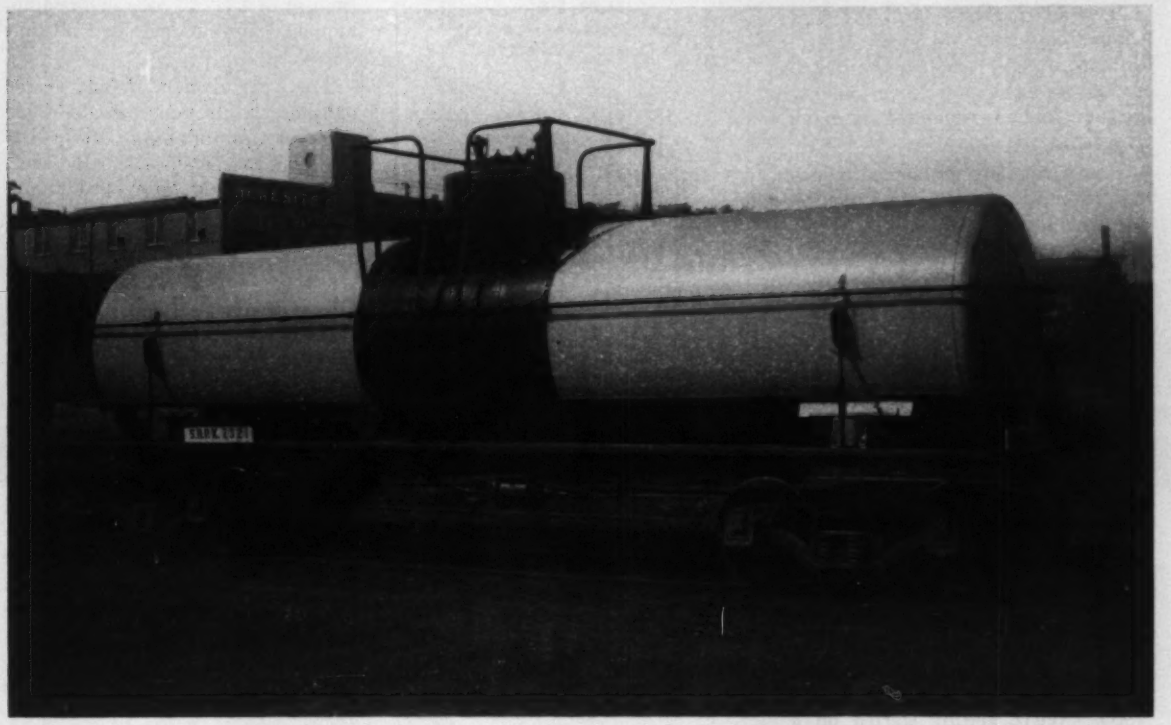
No. 1 heavy melting	32.25
No. 2 heavy melting	28.25
No. 1 bundles	32.25
No. 2 bundles	*20.00*
Mixed steel scrap	24.25
Mixed borings, turnings	13.00
Busheling, new factory:	
Prepared	32.25
Unprepared	26.25
Shovel turnings	17.00
Cast Iron Grades‡	
No. 1 machinery cast	46.50-48.00

†Nominal.
‡F.o.b. Hamilton, Ont.

HERESITE

REG. U. S. PAT. OFFICE

TANK CARS LINED WITH HERESITE FOR HIGH RESISTANCE AND EASE OF CLEANING



Light colored HERESITE coatings are now available for tank car lining, and are of special interest for cars handling food products. These light colored linings as well as the familiar dark HERESITE linings are all made from *pure phenol-formaldehyde* resins long known for their superior qualities.

Since 1946 more than 2000 tank cars have been lined with HERESITE for the transportation of chemicals, food products, and other industrial commodities.

HERESITE & CHEMICAL COMPANY

Main Office & Plant—Manitowoc, Wisconsin

General Coating, Inc.—Eastern Division—Woodbridge, New Jersey

Canada: Dominion Rubber Company, Ltd.
Montreal, Quebec

Europe: Aluminium-Schweisswerk A. G.
Schlieren-Zurich, Switzerland

Lead, Zinc Research Pays

Industry is battling back with world-wide effort to find new uses, expand old ones. Diecasting industry may have best year in 1960. Some brass mill prices cut

Nonferrous Metal Prices, Pages 190 & 191

A LITTLE research can be a big morale booster for an industry. Take lead and zinc. Only a few years ago, producers and fabricators were pretty much in the doldrums. They saw markets shrinking and competition chipping away at traditional outlets. Today, the industry has an air of confidence—mainly because of an expanded research program.

Researchers are probing into such blue sky areas as sound attenuation in missiles, protective clothing, bearings, auto undercoatings, and shielding in interplanetary vehicles.

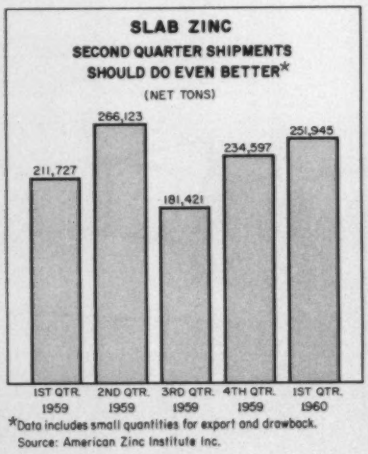
• **World-Wide Program** — Perhaps typical of the new look are the activities of lead-zinc research director, Dr. Schrader F. Radtke, who reports: "I've just finished a round the world trip—46,000 miles in 14 countries . . . lots of enthusiasm from producers and consumers . . . five countries now have co-ordinated research projects . . .

"One of most significant developments in zinc is the use of galvanized steel in unitized body construction by auto people . . . could be a 100,000-ton-a-year market by 1965. We're getting started on a project to develop new and better ways to weld galvanized steel . . . there's a big potential in powder metallurgy for zinc wrought products . . . colored diecastings are just about here.

"We're working on a vacuum metallizing line for coating steel with either lead or zinc.

"Lead coated steels are being developed to compete with tin plate. Lead's creep problem is being attacked to boost architectural uses . . . sound and vibration control uses for lead are particularly bright . . . resurgence of battery powered trucks means more lead use . . . some of the former cable market may be reclaimed through continuous extrusion of cable sheathing . . . lead is a modern metal and will find modern applications.

"There's no substitute for research. The more you do, the more ideas you get."



Sheet Copper Price Cut

More brass mill prices have been slashed to meet the threat of imports. The latest cut is in certain grades of sheet copper where domestic prices have been trimmed about 7 cents a pound. Quite a few price adjustments, both official and unofficial, have been made in the last few months to stem the rising import tide, which accounted for about 200 million lb of products in 1959 —ten times greater than in 1949.

Diecasting Uses Spurt

Demand for diecastings bounced back with a vengeance in 1959. Diecasters consumed 200,325 tons of aluminum (up 29.1 per cent from '59) and 325,150 tons of zinc (up 29 per cent), reports the American Die Casting Institute Inc. Particularly significant in zinc was the use of 150,000 tons in nonautomotive applications—an all-time record.

This year, demand should exceed or equal the previous records—202,350 tons of aluminum in 1957, 410,000 tons of zinc in 1955. By 1965, diecastings could be a 500,000-ton-a-year market for zinc, believes David Laine, ADCI's secretary.

Plenty of Tellurium

North America's six tellurium producers, worried by growing rumors of a forthcoming shortage, are hastening to assure customers that plenty of metal is available. They estimate annual production in the Western Hemisphere can be raised to 500,000 or 750,000 lb a year (from the present 300,000 lb) at present facilities alone. They say an additional 1 million lb can be refined from muds and residues accumulated by refineries.

Demand for the metal has vaulted because of expanded research and development going on in thermoelectrics. It has led to shortage rumors.

NONFERROUS PRICE RECORD

	Apr. 13 Price	Last Change	Previous Price	Mar. Avg	Feb. Avg	Apr., 1959 Avg
Aluminum	26.00	Dec. 17, 1959	24.70	26.000	26.000	24.700
Copper	33.00	Mar. 10, 1960	33.00–35.00	33.296	34.000	32.404
Lead	11.80	Dec. 21, 1959	12.30	11.800	11.800	10.992
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	99.25	Apr. 13, 1960	99.375	100.227	101.170	102.490
Zinc	13.00	Jan. 8, 1960	12.50	13.000	13.000	11.000

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig, 99.8%, Velasco, Tex.

Another example of National Roll quality control

Jack Russell, National's foundry superintendent, discusses an electric furnace heat with Bill Mason of the sales department.

Your steel rolls are custom-melted

National's electric furnace facilities for steel roll production are among the most modern in the industry. Furnace sizes, molding facilities, annealing equipment; all have been selected to provide the close metallurgical control needed at every step to produce high quality rolls that give long tonnage life.

This custom service extends to every roll order produced by National, whether steel, nodular iron, or iron. Since rolls are our only business, every phase of our operations is staffed with men who know *their* business, and how it affects *yours*.

We'd like to have you meet some of these men. The best way is to plan a visit to our modern plant at Avonmore. But if time prohibits this, let us send you a brochure that will tell you more about why . . .

National's the growing name in rolls

NATIONAL ROLL & FOUNDRY DIVISION

GENERAL STEEL CASTINGS CORPORATION, Avonmore (Westmoreland County), Pa.

General Steel Castings Corporation, General Offices: Granite City, Illinois • Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.60; No. 43, 25.90; No. 195, 30.70; No. 214, 31.50; No. 356, 26.30. 30 lb ingots; 10 lb ingots, add 0.4 cent per lb; 6 lb ingots, add 0.6 cent per lb.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg, $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 50 lb, $11 per lb f.o.b. Minneapolis; 50-99 lb, $10; 100-499 lb, $9.50; 500 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $213-215 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.09 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 99.25.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.50-4.25.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb., New York basis, add 0.50. High grade, 14.50; special high grade, 14.75 deld. Diecasting alloy ingot No. 3, 16.50; No. 2, 17.00; No. 5, 16.75 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 27.25-29.00; No. 12 foundry alloy (No. 2 grade), 25.00-25.25; 5% silicon alloy, 0.60 Cu max., 25.50-25.75; 13 alloy, 0.60 Cu max., 25.50-26.00; 195 alloy, 27.75-28.75; 108 alloy, 25.25-25.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.50; grade 2, 24.25; grade 3, 23.25; grade 4, 22.75.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

Magnesium Alloy Ingot: A63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $4.00-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base, f.o.b. customer custody.

Thickness Range (in.)	Widths (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.10-47.70
0.136-0.096	24-72	72-180	45.50-48.70
0.096-0.077	24-72	72-180	46.20-50.00
0.077-0.068	24-72	72-180	46.70-51.70
0.068-0.061	24-72	72-180	46.70-55.50
0.061-0.048	24-72	72-180	47.30-57.30
0.048-0.038	24-72	72-180	47.80-60.20
0.038-0.030	24-72	72-180	48.20-65.30
0.030-0.024	24-60	72-180	48.70-56.60
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-36	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	44.60	49.40
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base, 12 ft lengths.

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	72.90	75.80	....	....
0.188	....	....	....	78.20
0.250	58.00	61.60	70.70	72.30
0.375	57.20	62.40	69.00	70.50
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	57.20	62.40	69.00	70.50
0.625	57.20	62.40	65.80	66.60
0.750	55.70	60.70	59.60	62.60
0.875	55.70	60.70	59.60	62.60
1.000	55.70	60.70	59.60	62.60
1.125	53.30	58.30	57.50	60.40
1.250	53.30	58.30	57.50	60.40
1.375	53.30	58.30	57.50	60.40
1.500	53.30	58.30	57.50	60.40
1.625	51.00	55.60	....	58.20
1.750	51.00	55.60	56.30	58.20
1.875	51.00	55.60	....	58.20
2.000	51.00	55.60	56.30	58.20
2.250	49.50	54.00	....	58.20
2.500	49.50	54.00	....	58.20
2.750	47.90	52.20	....	58.20
3.000	47.90	52.20	....	58.20
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.20-56.90; 6061, 43.20-56.90; 7075, 61.50-71.20; 7079, 66.50-76.20.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 31.55; 1¼ in., 42.75; 1½ in., 51.05; 2 in., 61.70; 3 in., 123.40; 4 in., 169.55; 5 in., 229.60; 6 in., 304.60; 8 in., 458.40; 10 in., 706.45 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	44.70-46.20	53.20-59.00
15-17	44.70-46.20	55.60-60.80
18-23	45.20-46.80	57.70-66.40
24-32	45.20-46.80	65.60-78.80
33-38	48.80-51.40	82.30-93.40
39-44	58.70-62.40	99.90-121.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.10; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.25-23.50; No. 2 heavy copper and wire, 20.50-20.75; light copper, 18.00-18.25; No. 1 composition red brass, 16.00-16.50; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 33.00c)		
	Sheets, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	50.00	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	58.86	52.21	62.69	....	20.875	26.625	19.875
Muntz Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48.68	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	14.937
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.00-15.50; new brass clippings, 14.50-15.00; light brass, 10.50-11.00; heavy yellow brass, 11.50-12.00; new brass rod ends, 12.00-12.25; auto radiators, unsweated, 12.50-13.00; cocks and faucets, 13.00-13.50; brass pipe, 13.00-13.50.

Lead: Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.00-9.50.

Monel: Clippings, 27.00-28.00; old sheets, 23.00-24.00; turnings, 20.00-22.00; rods, 27.00-28.00.

Nickel: Sheets and clips, 53.00-54.00; rolled anodes, 53.00-54.00; turnings, 41.00-42.00; rod ends, 53.00-54.00.

Zinc: Old zinc, 3.25-3.75; new diecast scrap, 4.00-4.50; old diecast scrap, 2.25-2.75.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 15.00-15.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 12.50-13.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 16.50-17.00; segregated high copper clips, 15.50-16.00; mixed low copper clips, 15.50-16.00; mixed high copper clips, 15.00-15.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.75-12.00; clean borings and turnings, 10.50-11.00; segregated low copper clips, 15.50-16.00; segregated high copper clips, 14.50-15.00; mixed low copper clips, 15.00-15.50; mixed high copper clips, 14.00-14.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.
Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.00; light copper, 22.00; refinery brass (60% copper) dry copper content, 21.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.00; light copper, 22.00; No. 1 composition borings, 20.50; No. 1 composition solids, 21.00; heavy yellow brass solids, 15.25; yellow brass turnings, 14.00; radiators, 16.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.

Copper: Flat-rolled, 50.04; oval, 48.00; 5000-10,000 lb; electrodeposited, 42.00; 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 117.50; 200-499 lb, 116.00; 500-999 lb, 115.50; 1000 lb or more, 115.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.40 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,900 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 78.00; 100-600 lb, 68.80; 700-1900 lb, 66.00; 2000-9900 lb, 64.10; 10,000 lb or more, 62.80.

Stannous Chloride (Anhydrous): 25 lb, 153.20; 100 lb, 148.30; 400 lb, 145.90; 800-19,900 lb, 105.00; 20,000 lb or more, 98.90.

Stannous Sulphate: Less than 50 lb, 138.40; 50 lb, 108.40; 100-1900 lb, 106.40; 2000 lb or more, 104.40.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 185*)

12,500 tons, two units, Consolidated Edison Co., Ravenswood, Queens, N. Y., pending.

5200 tons, state bridge, South Grand Island, Erie County, N. Y., bids Apr. 21.

5000 tons, George Washington Bridge bus terminal, Port of New York Authority, New York; new plans expected shortly.

850 tons, Public School No. 49, Staten Island, N. Y., Plant Construction Co., New York, low on the general contract.

500 tons, plate shop, F. L. Smidth Co., Lebanon, N. J.; bids in.

475 tons, I-beams, Navy, General Stores Supply Office, Philadelphia, two contracts, bids Apr. 21 and Apr. 22.

400 tons, estimated, Public School No. 247, Brooklyn, N. Y.; bids Apr. 21.

250 tons, one 2-span and two 3-span composite wide flange beam bridges, Bridgewater, Vt.; bids May 6, Montpelier, Vt.; also, 125 tons of concrete reinforcing bars are required.

100 tons or more, vehicle maintenance shops, Ft. Greely, Alaska; Peter Kiewit Sons Co., Seattle, low at $655,597.

100 tons, chimney plates, draft tubes, etc., Mayfield Dam project; Star Iron & Steel Co., Tacoma, Wash., sole bidder at $28,122 to Tacoma, Wash.

95 tons, plate girder bridge, Clearwater River, Washington State; Owen Bros., Port Angeles, Wash., low at $114,764.

Unstated, steel frame building addition, Hanford Works; also stainless steel lines and reinforcing for underground vault; bids to Atomic Energy Commission, Richland, Wash., May 10.

REINFORCING BARS . . .

REINFORCING BARS PLACED

430 tons, Port of Seattle terminal pier, to Pacific Coast Div., Bethlehem Steel Co., Seattle; General Construction Co., Seattle, general contractor.

290 tons, dormitory, Washington State College, Bellingham, Wash., to Northwest Steel Rolling Mills Inc., Seattle; Elford Construction Co., Bellingham, general contractor.

290 tons, Port of Seattle, terminal pier, to Soule Steel Co., Seattle; General Construction Co., Seattle, general contractor.

116 tons, Coast Guard terminal, Seattle, and Mines building, University of Idaho, Moscow, Idaho, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Manson Construction & Engineering Co., Seattle, general contractor.

CLASSIFIED ADVERTISING

IF YOU OPERATE A FURNACE . . . . .

We will purchase your scrap linings, retorts, conveyors, muffles, racks, etc. Any item made of Nickel alloy.

Write, Wire or Call
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610 W. 8th St.
Jamestown, N. Y.
Phone 61-154

structural steel engineer

for engineering dept. of highly respected structural steel fabricator and erector in the East. Must have practical experience in erection with technical ability to advance to executive status. We are looking for young col. grad. interested in a permanent connection. Advancement unlimited. Salary Open. Send full resume to:
Box 844, STEEL, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

MANUFACTURING MANAGER - OPERATIONS MANAGER—Heavy Equipment, Metal Stampings, all related operations machining, welding, assembly, excelling in tool design, product design, and composite experience. Experience in export and import procedures, speak Spanish and Tagalog. Prefer medium sized firm with good potential. Salary in five figure bracket with benefits. Age 49. Resume sent on request to principals. Write Box 846, STEEL, Penton Bldg., Cleveland 13, Ohio.

FOR CLASSIFIED RATES
STEEL, Penton Bldg., Cleveland 13, O.
And Further information write

FOR SALE

#16 FARREL-BIRMINGHAM
(2) Floating Shafts Each Consisting Of: 2—#16 Flex. Half Couplings and 1 Shaft 16" Dia. x 4' 0⅛" Long
(3) E16 Solid Half Couplings

#14 FARREL-BIRMINGHAM
(1) Floating Shaft Consisting Of: 2—#14 Flex. Half Couplings and 1 Shaft 14" Dia. x 5' 1⅛" Lg.
(1) Floating Shaft Consisting Of: 2—#14 Flex. Half Couplings and 1 Shaft 14" Dia. x 7' 6⅝" Lg.
(5) Floating Shafts Each Consisting Of: 2—#14 Solid Half Couplings and 1 Shaft 14" Dia. x 8' 7¼" Lg.
(5) #14 Flex. Half Couplings
(6) #14 Shells
(6) #14 Hubs
(6) #14 End Covers
(6) #14 Solid Half Couplings

#12 FARREL-BIRMINGHAM
(1) Floating Shaft Consisting Of: 2—#12 Solid Half Couplings and 1 Shaft 12" Dia. x 9⅛" Long
(3) #12 Flex. Half Couplings
(1) #12 Shell
(1) #12 Hub
(1) #12 End Cover
(2) #12 Solid Half Couplings

71 Pcs. 12" Dia. x 1" Wall x 59¾" Lg. C.I. Table Rolls, Dead Eye Journal End 3⅛" Dia. x 7¼" Lg., Driven End 3⅛" Dia. x 17" Lg. Including Gear—Can Be Converted To Suit

WILL SELL ALL OR PART
PRODUCTION EXPERTS, INC.
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VUlcan 3-3220

MOTORS • GENERATORS
TRANSFORMERS
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WORLD'S LARGEST INVENTORY
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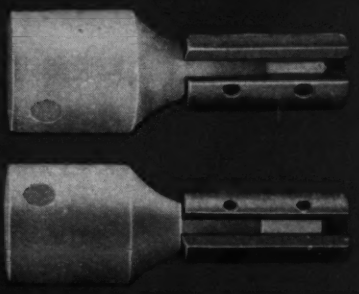
DOUBLE

the service life of ordinary

MAGNETIC SOCKETS



APEX REVERSIBLE

MAGNETIC SOCKETS

If you aren't using magnetic sockets, you may be overlooking a good way to trim assembly costs. If you are using magnetics, you can cut costs even more by specifying Apex *Reversible* Magnetic Sockets to get twice as much service from a single socket.

When one end of an Apex reversible magnetic socket becomes worn, simply turn the socket end for end, reposition the magnet, and you'll have a "new" socket ready for work. Sockets are available with a full range of shank types and sizes to fit all popular makes of power and manual drivers.

Here's another way APEX helps you cut fastening costs!

The magnet in any Apex magnetic socket—Standard, Bolt Clearance or Reversible types—can be transferred from a worn socket to a new socket without requiring special tools. Better still, when your Apex sockets become worn, simply return them with your order for new sockets. We'll allow credit for all usable magnets and ship your new sockets promptly. We'll do the work . . . you'll save time, money and labor.

CATALOG 30-A lists the complete line of Apex magnetic sockets, for use with impact tools. Write, on your company letterhead please, for your copy. If you have an unusual fastening problem, we'll quote promptly on special sockets.

APEX FASTENING TOOLS

SCREWDRIVING • NUT RUNNING • SPECIAL

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Coming Apr. 25

IN

STEEL

Lead, Zinc Producers Plot Strategy for Market Gains

. . . here's an industry that's taking on new aggressiveness — in research and development as well as in marketing.

Three of the industry's leaders will tell you what's new in lead and zinc and how it'll affect you—in next week's STEEL.

Take a cost-wise look at your assembly operations,

and you'll see that fasteners

represent real money. To make sure

it is money saved—not lost—

count on *Continental*

MORE TYPES OF FASTENERS Continental Assembly Specialists are unbiased toward any particular types . . . Continental makes all types. The fastener they recommend for your job is the one proved best by careful cost analysis.

MORE STANDARDS IN STOCK Continental can supply any recognized standard type, style or size. Also, many fasteners ordinarily considered "specials" are available among the millions of screws constantly in stock to meet needs of Continental customers.

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MORE "SPECIAL" PRODUCTION FACILITIES With Continental's modern, precision controlled equipment, many special shaped screws formerly machined from bar stock can be produced faster, at lower cost — with higher tensile strength and excellent surface quality.

Let Continental Assembly Specialists analyze your operations and help you find cost-saving opportunities that are often overlooked. You'll see why fastener users everywhere agree, *"You can count on Continental."* Write or phone: Continental Screw Co., 462 Mt. Pleasant St., New Bedford, Massachusetts.

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HOLTITE FASTENERS

HOLTITE PHILLIPS AND SLOTTED HEAD
WOOD • MACHINE • TAPPING • THREAD CUTTING • SEMS • NYLOK
HY-PRO PHILLIPS INSERT BITS AND HOLDERS

CONTINENTAL SCREW COMPANY EST. 1904

HY-PRO TOOL COMPANY Division RESEARCH ENG. & MFG. INC. Subsidiary

Automatic Bull Block

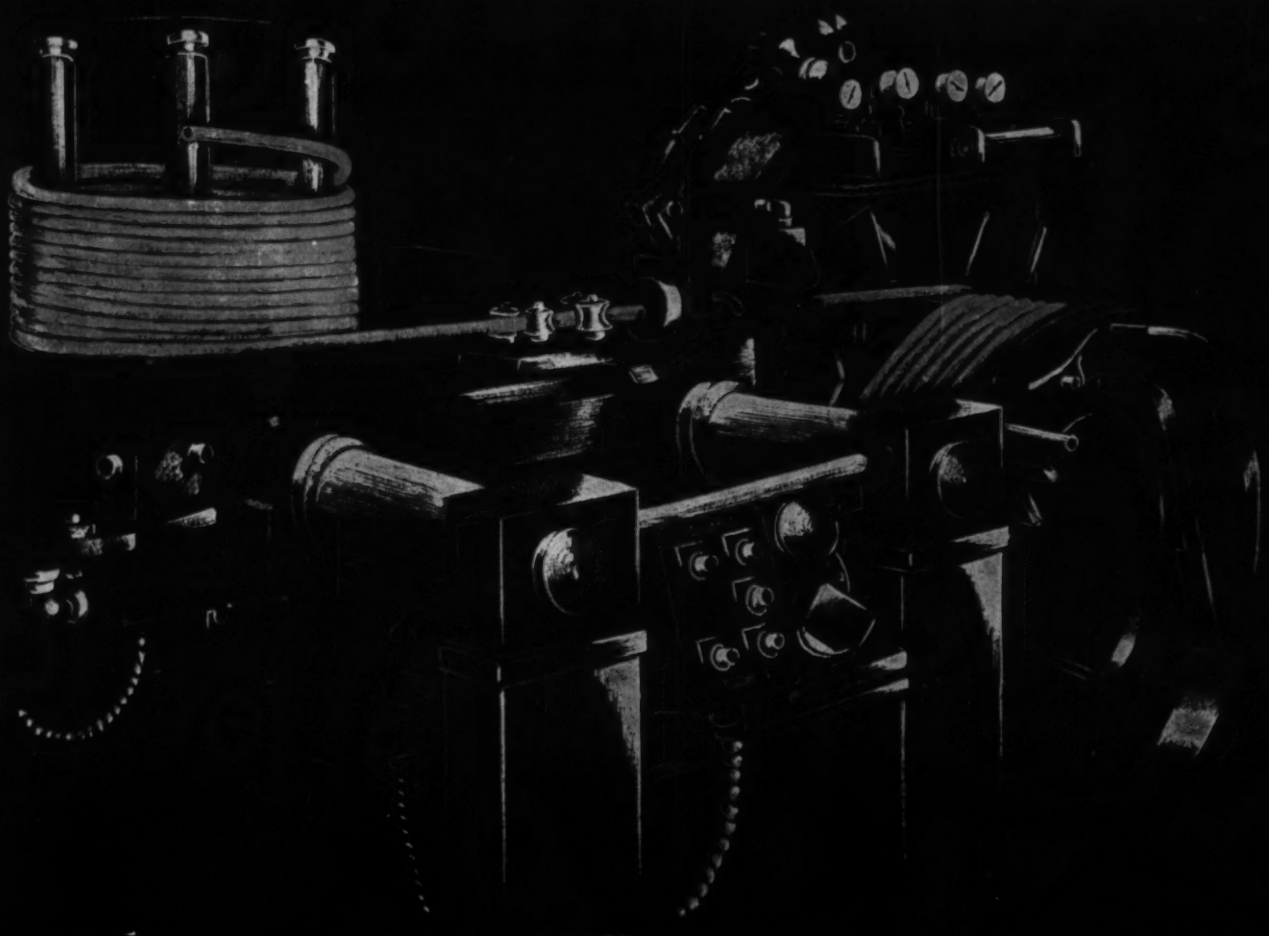
for copper

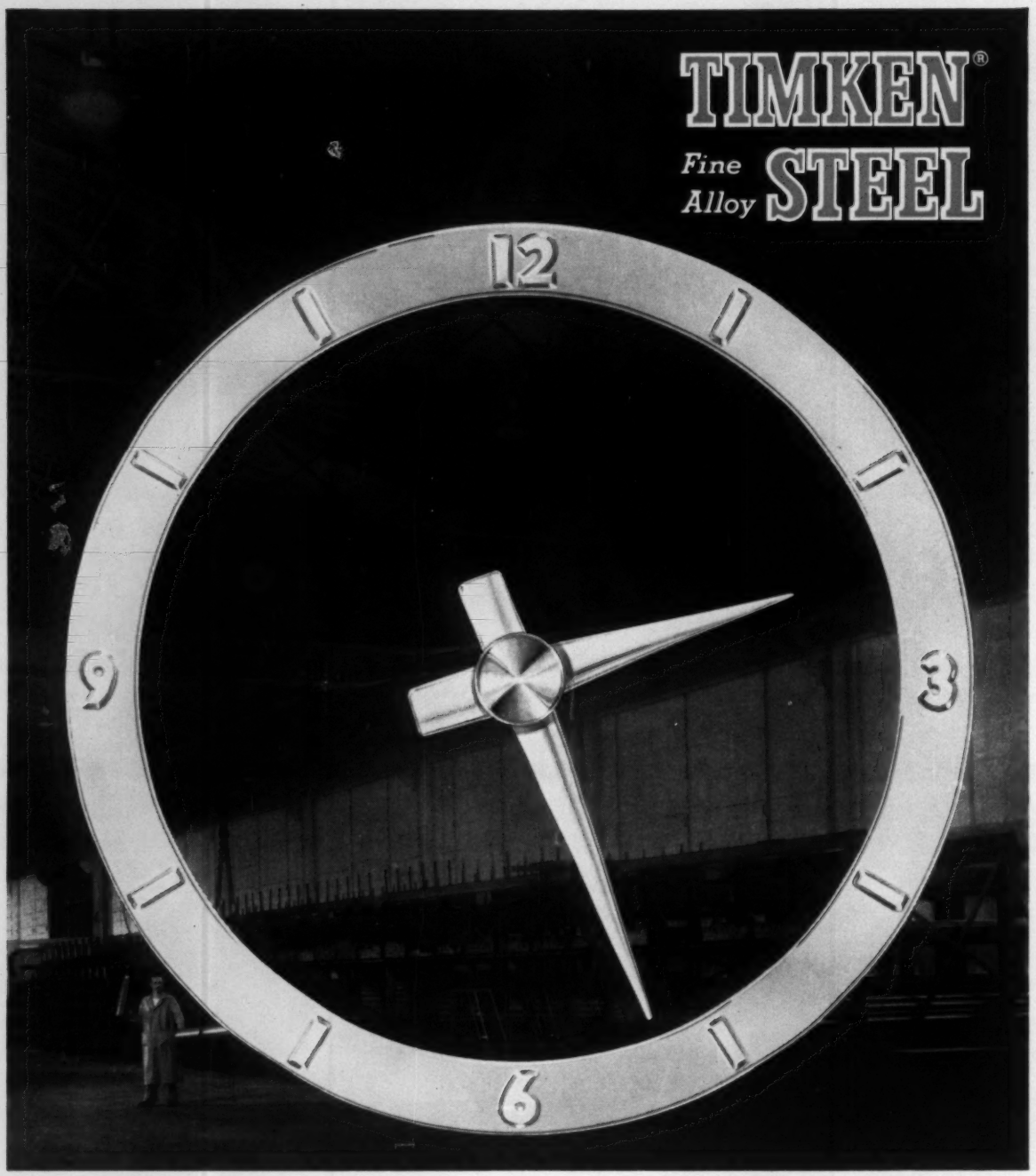
Place coil in tray and feed point into die. Press the button, that's all. This Automatic Bull Block does the rest. Finished tubing emerges. Features include Automatic Gripping, Automatic Grip Release, Heavy Traverse Feed.

This is a 36" Bull Block drawing down copper from 5/8" to 1/8" at high speeds.

The Automatic Bull Block can be furnished in all sizes up to 84" diameter. Producing long lengths at high speeds automatically really brings down those costs. For complete information on the Block or any other Cold Draw equipment for tubes, bars, or shapes, write to: Cold Draw, Aetna-Standard Division, Blaw-Knox Company, Pittsburgh 30, Pennsylvania.

Aetna-Standard Division
BLAW-KNOX





ANY TIME is the right time to order Timken® 52100 steel tubing. We'll ship within 24 hours from our new warehouse. 101 sizes of tubing are available, ranging in size from 1″ to 10½″ O.D. with a wide selection of wall thicknesses. It's handy to use when you need less than mill quantities, too! We can also give you extra fast delivery on 50 sizes of 4620 tubing. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*